

21 October 1982 Vol 1 No 27

35p

FREE COMPUTER BUY/SELL SERVICE
COMPUTER SWAP
SEE PAGE 24

New Spectrum tapes: Value for money guide

More Spectrum ellipses

Learn machine code

BBC synthesiser

Cover Story:
Moonlander on Vic20

Win a Jupiter Ace in our Better than Basic competition

POPULAR
Computing
WEEKLY

The Team

Editor
Brendon Gore

Reporter
David Kelly [01-930 3271]

Sub-editor
Ninette Sharp

Editorial Secretary
Theresa Lacy

Advertisement Manager
David Lake [01-839 2846]

Advertisement Executive
Alastair Macintosh [01-930 3840]

Managing Editor
Duncan Scot

Publishing Director
Jenny Ireland

Popular Computing Weekly,
Hobhouse Court 19 Whitcomb Street
London WC2
Telephone **01-839 6835**

Published by Sunshine Publications Ltd

Typesetting, origination and printing by
Chesham Press, Chesham, Bucks

Distributed by S M Distribution
London SW9 01-274 8611 Telex 261643

Subscriptions
You can have *Popular Computing Weekly* sent to your home the subscription rate is **£19 95** per year for addresses in the UK **£37 40** overseas

How to submit articles
Articles which are submitted for publication should not be more than 1000 words long

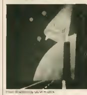
All submissions should be typed and a double space should be left between each line

Programs should whenever possible be computer printed

At present we cannot guarantee to return every submitted article so please keep a copy

Accuracy
Popular Computing Weekly cannot accept any responsibility for any errors in programs we publish although we will always try our best to make sure programs work

This Week


[illegible] by Stuart Hughes

Editorial

The Hunt committee report on cable tv, due to be published on Tuesday October 12, could change the face of British television

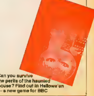
The report is believed to favour the setting up of a cable network for all of Britain s major towns and cities Given the go-ahead by the government, television viewers could be watching their first cable tv programmes within two to three years As many as 30 different channels could be available, compared to the present three

But, if the Hunt committee's report has serious implications for tv, it has no less serious implications for microcomputers The linking up by cable of Britain's towns and cities would provide microcomputer users with unparalleled opportunities for the creation of their own networks

Once a cable system has been established, it should not be difficult to cater for both tv and microcomputer users The only real problem is the initial cost of laying the cable, but that is something the prospective cable tv operators should pay for

With cable networks readily available, Prestel's Micronet 800 scheme could find it has competitors sooner than it first thought

Next Week



Can you survive the perils of the haunted house? Find out in Hallowe'en — a new game for BBC





Acorn joins the classroom battle

ACORN Computers has announced its own discount scheme to assist the Department of Industry's efforts to encourage the use of microcomputers in schools

This follows the launch of a similar scheme by Sinclair Research in September (see *Popular Computing Weekly*, September 30)

Under the Acorn offer, any school — primary or secondary, state or public — that buys a BBC Model B microcomputer will also receive a free Econet interface, value £46. The discount is valid for any purchase — under the DoI scheme or not — and for every machine purchased by a school There is no limit on the number of machines per school to which the offer applies

An Acorn spokesman explained "Acorn believe Econet and schools go hand in hand The BBC machine was designed for networking in the classroom "

The company hopes schools will buy one BBC micro plus disc interface (including the free Econet interface) at half price under the DoI offer, and then buy further machines with the free networking interface fitted In this way the DoI machine will operate as the master file server and the others will be able to access its discs through the Econet system

The Acorn scheme runs until the end of 1984 Acorn estimate that by then the offer will have been worth over £5m to the 32,000 eligible schools

New range of business micros

A RANGE of small business microcomputers and software has been announced by a new company, Information and Technology Computer Services

The Andromeda series includes 36 models each supplied with a selection of software, costing between £595 and £3295

ITCS director, David Lewis-Pryce said "We offer a completely new approach — the user buys the software and gets the hardware on a free loan "

At the low-cost end of the range is the Alpha O This unit consists of the Z80 processor 63-key Qwerty board, and 125K disc drive Also included are ITCS Word processing and Data-management packages The system costs £595 plus £120 per annum maintenance

More expensive options include dual 125K disc drives and a 12 inch video monitor These variants are accompanied by Financial Planning Integrated Accounting and Communications software packs

Said David Lewis-Pryce "The Andromeda range has been launched with the intention of its becoming a serious contender as the world's leading microcomputer "

Extended Basic to put in your pocket

SHARP is to launch a new pocket-size microcomputer in time for Christmas

Called the PC-1251, it is an improved version of the PC-1211 Despite its small size — 5⁹⁄₁₆ × 2¾ × ⅜ inch — the PC-1251 has 24K Rom and 4 2K Ram and runs a version of Basic extended from that on the PC-1211 including *Dim*, *Str$* and *Inkey$* commands

The new machine features a Qwerty style keyboard with separate numeric pad and a 24 character 5 × 7 dot matrix liquid-crystal display It will work for up to 300 hours on one battery, and memory in Ram is protected by a battery back-up when the machine is not in use

Also available, to connect to the new computer, is the CE-125 integrated printer/microcassette recorder The PC-1251 clips into this unit which allows programs to be easily saved on to tape and gives a 24-character print-out from the unit's thermal printer The CE 125 is powered by a rechargeable Ni–Cad battery

The complete system — PC-1251 plus CE-125 — has the dimensions of an inch-thick A5 paperback book

Available at the beginning of December, the PC-1251 will cost £79 95 including VAT

Sharp PC-1251 with CE-125 printer/microcassette recorder

Clive has vision of the year 1990

CLIVE Sinclair has predicted the disintegration of manufacturing industries in the UK by 1990

"The idea that we need a manufacturing industry to pay for the rest of our society is a fallacy," he said speaking on the BBC 2 television programme, *Futures*, on October 7

Clive Sinclair

"The truth is that Britain is in the wrong part of the world to make conventional goods By the 1990s we must turn from the products of the material to products of the mind We are a particularly creative people and where others can produce we can design Hong Kong manufacturers are even now ready to employ our best freelance industrial designers In the next decades China and India will become the great producing nations

"I believe the next 15 years will be among the most momentous in our economic history — we are on the edge of the most sweeping and rapid changes we have ever seen," he said

April '83 date for festival of computers

THE Association of London Computer Clubs plans to hold the capital's first Computer Festival next Spring

The event, including open days, seminars, exhibitions and workshops will be held from April 3 to 17 Central Hall will see an exhibition from April 14 to 16, and a conference is being organised at City University

For further details contact Robin Bradbeer, Association of London Computer Clubs, The Polytechnic of North London, London N7

Information Technology '82 doubles fund target

ONLY half the money donated to finance Information Technology Year 82 has been provided by the computer industry Less than half that has come from UK companies

The City and oil companies have provided the bulk of the funding So far £1 5m has been supplied which has been matched by a promised government contribution making a total of £3m

This figure is more than double the IT '82 target

Letters

write to Letters, Popular Computing Weekly, Hobhouse Court, 19 Whitcomb Street, London WC2

Copywriting English worde

I saw an advertisement in the *Daily Telegraph*, September 27, which disturbs me very much I am referring to Atari's alleged claim to the name *Defender* together with alleged rights concerning a video game of that name

Let me explain what disturbs me The word *Defender* is one that is in common English usage — particularly in the games of football and chess I cannot for the life of me see how a common English word can suddenly be tied up in this way — if they had called it *Atari-defender* that would be very different

I do not see how this name can be tied up even if linked to a game concept either Where is the line to be drawn? Is *Protector* going to be an infringement? In which case maybe Atari are at fault since a book by Larry Niven is so titled and a game based on that book would surely be legitimate

Secondly, I do not see why Atari should have what I consider to be the monumental cheek of demanding others to get in touch with them Surely the onus is on Atari to get in touch with others if they consider that their copyright is being infringed I think I could make out a good case for their publishing listings as part of the public claim to copyright I suspect that, when put to the test, copyright in computer listings will turn out to be very similar to musical copyright, in which case Atari are attempting to stand on some non-existent legs! At any rate they are trying to establish some kind of precedent — and I believe that to allow them to do so will be very dangerous and costly indeed

Finally, they *say* they were first with this game — but how do we know? And how much of what they are trying to tie up in this way is merely a *general concept* finding expression in a computer listing? It has something of the flavour of Wilkie Collins suing Charles Dickens because Collins wrote the first detective story, *The Moonstone Mystery*; and in *Bleak House* Dickens made use of the detective Inspector Bucket In my view Atari are trying to tie down to copyright far too broad a concept and if they succeed we shall all be the losers

As an ordinary "consumer" I would urge those whose interest lies in developing games not to be put off — so long as they do not descend to plagiarism I suspect we have some careful defining to do, and I suspect also that Atari's present position will be laughed out of court

R J Redrup
The Vicarage
Kea
Truro
Cornwall TR3 6AE

Sticky fingering

I have had a ZX81 with 16K Ram pack since March I cannot afford a proper keyboard yet, so I use Sellotape sticky fixers which I stick on to the pads to make a temporary keyboard I find this is a great help, especially when playing games I thought you might be interested to know this in case other people want to try it

Nicholas Butterworth
18 Hillyfields
Dunstable
Bedfordshire LU6 3NS

Backchat and criticism

Your correspondence is getting very interesting, not to say controversial I enjoyed the backchat from Messrs Wiseman and Meardon (issue 22)

In the same issue, Keith Driscoll's correction of the Sinclair manual refers to the ZX81 manual I would maintain that this is a well publicised item, long predating your publication The earliest reference I can find is in an *Interface* book dated August 1981 I have however seen this mentioned in magazines quite regularly If it's the only error in the manual worth mentioning, then it's some manual

Items from the Spectrum manual may interest some readers Page 114, bottom, gives extended mode numeral key values to pretty up listings The *Chr$* values printed are wrong in two instances, and the actual *Chr$* values obtained are consistent with the table at the top of the same page Thus, in extended mode

```
9 GIVES CHR$ 18 (not 12) + CHR$ 1
CAPS SHIFT 9 GIVES CHR$ 18 (not
   19) + CHR$ 1
```

C J Hewish
13 Beacon Road
London SE13 6EQ

How on earth?

I was watching an ITV news bulletin on September 21 when on came an item about the Prime Minister's visit to Japan It stated that Mrs Thatcher awarded the Japanese Premier an English-built computer, a Sinclair Spectrum I would like to know when Mrs Thatcher ordered her Spectrum and how long it took for her to get it, because I have been waiting 18 weeks for mine

Christopher Watson
33 Laneside Drive
Bramhall
Cheshire

Grainy offering

I hope he will forgive me for saying so, but I feel there is a better solution to John Grain's number reversal problem than that offered by Ian Beardsmore John's letter implied that he wanted a variable to be reversed, and what he was offered is a *string* reversal May I humbly suggest

```
10 INPUT X
20 LET X$ = STR$ X
30 FOR J = LEN X$ TO 1 STEP -1
40 LET X$ = X$ + X$ (J)
50 NEXT J
60 LET X = VAL X$ (LEN X$ /2 + 1
   TO)
70 PRINT X
```

This truly reverses the value of the variable entered and, by the way, offers an example of the much neglected reverse *Step* function available on the ZX81

Nick Godwin
4 Hurkur Crescent
Eyemouth
Berwickshire
Scotland TD14 5AP

Jumping out of hibernation

I would like to thank all the people who have sent me details of 'bugs' in the Spectrum In response to their interest, I would like to give the details of the latest 'bugs' to come out of hibernation

1 The *Chr$ 8* error The programmer has tested against the 'wrong limit' and hence backspacing to the top line is not possible However, if on the top line backspacing is possible, but 'never never land' is reached when backspacing from location '0,0'

2 The *Screen* error The resultant string obtained by using *Screen$* is stored twice on the calculator stack — instead of once as it should be Hence

```
10 PRINT '12'
20 PRINT SCREEN$ (0 0) +
   SCREEN$ (0 1)
```

gives '22' instead of the expected '12' The problem can be avoided by using temporary strings for each call to *Screen$*, or by avoiding the use of *Screen$* after a binary operator

3 The *Str$* error Have you tried

PRINT A + STR$0 1 which gives only '0 1'

or

PRINT 1 + VAL STR$0 1 which gives only '0 1'

It appears that when the operand of *Str$* is between 'minus one' and 'plus one', but not zero, that an extra zero is put on the calculator stack. Hence there are more stacked results than stacked operations and the extra result is lost. Again, the problem can be avoided by using temporary strings or taking care after binary operators

4 The *Close* error There is no 'end-marker' at the end of the 'close stream look-up' tables so using *Close#4* before stream 4 has been opened leads one once again to 'never never land' and returning is problematical

I suspect that there are further 'bugs' in the expression evaluation routines but these are not apparent in Basic as yet

Ian Logan
24 Nurses Lane
Skellingthorpe
Lincoln LN6 5TT

If you have an opinion you want to express, or have spotted an error that needs correcting, write to Letters, Popular Computing Weekly, *Hobhouse Court 19 Whitcomb Street, London WC2*

Moon Landing

A new game for Vic20
by Czes Kosniowski

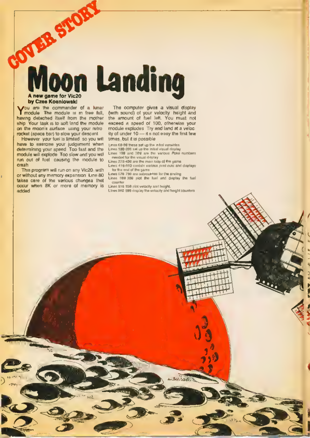
You are the commander of a lunar module. The module is in free fall, having detached itself from the mother ship. Your task is to soft land the module on the moon's surface using your retro rocket (space bar) to slow your descent.

However your fuel is limited so you will have to exercise your judgement when determining your speed. Too fast and the module will explode. Too slow and you will run out of fuel causing the module to crash.

This program will run on any Vic20, with or without any memory expansion. Line 80 takes care of the various changes that occur when 8K or more of memory is added.

The computer gives a visual display (with sound) of your velocity, height and the amount of fuel left. You must not exceed a speed of 100, otherwise your module explodes. Try and land at a velocity of under 10 — it's not easy the first few times, but it is possible.

Lines 60-90 these set up the initial variables
Lines 100-260 set up the initial visual display
Lines 190 and 200 are the various Poke numbers needed for the visual display
Lines 270-400 are the main loop of the game
Lines 410-660 contain various print outs and displays for the end of the game
Lines 670-790 are subroutines for the sound
Lines 800-900 plot the fuel and display the fuel counter
Lines 910-950 plot velocity and height.
Lines 960-990 display the velocity and height counters



```
10 REM ****************
20 REM * MOON LANDING  *
30 REM *     BY        *
40 REM *CZEK MARMLOOMI4
50 REM ****************
60 REM SETTING UP
70 POKE36879 24 RS=PEEK(36866)
80 G=PEEK(44)>10 VV=8146-G*3584 GG=38866+G*512
90 S5=36878 S4=S5-1 S3=S5 2 S2=S5-3
100 PRINT [CLR][BLU]VELOCITY HEIGHT FUEL  "
110 PRINT [7CD]MAX.-"  "100"  "[4CD] 50.-"
120 HH=VV+7 FF=HH+7
130 PRINT [POWES[CD]"
140 FORI=0TO19
150 PRINT"[4CR][RED]       [BLU][RVS] [OFF]      [GRN][RVS] [OFF][BLU]  "
160 NEXTI
170 PRINT"[4ET]       [BLU]       [GRN]       [HOME]"
180 POKE88 4 POKEVV 108
190 W(0)=98 W(1)=100 W(2)=111 W(3)=125
200 W(4)=98 W(5)=240 W(6)=247 W(7)=227
210 V=0+80RND(1)
220 F=160 H=160 A= 9 B=1 0 FU= 5+.40RND(1)
230 POKEFF+21 46
240 POKEFF+22 57
250 POKEFF+23 57
260 POKES2 15 POKES4 150 POKES3 130
270 REM START OF GAME
280 IFPEEK(197)=32THENGOSUB800
290 V=V+A
300 POKES4 128+INT(V*127/GHB)
310 POKES3 130-INT(V*127/3HB)
320 IFV<=0THENPOKES2 130-INT(V)
330 POKEVV+88 44-SGN(V)
340 X=VV+21 Y=ABS(V) GOSUB910
350 X=HH+28 Y=H GOSUB910
360 POKEX+3 48+INT(H(0)-10*INT(A
370 X=INT(V/8) Y=INT(V-8*X) Z=VV GOSUB960
380 H=H-V* 01
390 X=INT(H/8) Y=INT(H-8*X) Z=HH GOSUB960
400 IFX>=0AND V<=18THEN270
410 REM END OF GAME
420 PRINT [HOME][3CD][BLU]    VELOCITY =" INT(V)
430 IFV>100THENPRINT"[BLU]YOU WENT 200 FAST AND  "  "        EXPLODED"
440 IFV<=100ANDV>2THENPRINT"[BLU]   CRASH LANDING"
450 IFV<=20ANDV>10THENPRINT"[CD]NOT BAD  BUT" ON INT(5*RND(1))+1GOSUB740 760 770
780 790
460 IFV<=10THENPRINT [CD] [BLU]     WELL DONE"
470 POKES3 0 POKES4 300
480 FORL=15TO0STEP-1
490 POKES5 L
500 FORI=1TO50 NEXTI
510 NEXTL
520 POKES5 10
530 FORL=0TO17 GOSUB670 NEXTL
540 POKE36867 130
550 FORI=0TO200 NEXTI
560 FORL=17TO0STEP-1 GOSUB670 NEXTL
570 POKE36866 RS
580 FORI=0TO800 NEXTI
590 POKES4 0 POKES5 0
600 FORI=1101300 NEXTI
610 PRINT"[CD][FUD]  ANOTHER GO? Y OR N   [BLU]"
620 POKE198 0
630 GETG$ IFG$=""THEN630
640 IFG$<>"N"THEN0GOTO60
650 PRINT"[CLR][BLU][5CD]   ON   BYE FOR NOW[4CD]"
660 END
670 REM PART OF END
680 POKES8 330+L
690 POKE36864 12+L
700 POKE36863 38+2*L
710 POKE36866 RS-L
720 POKE36867 174-L*2
730 RETURN
740 REM PART OF END
750 PRINT"YOU HAD A LUCKY ESCAPE" RETURN
760 PRINT" YOUR CRAFT IS RUINED" RETURN
770 PRINT"THE IMPACT BROKE YOUR          LEGS        " RETURN
780 PRINT YOU ARE RUINED FOR LIFE" RETURN
790 PRINT"YOUR LICENCE HAS BEEN        REVOKED        "
800 REM FUEL PLOT AND COUNTER
810 IFF<1 5THENRETURN
820 F=F-FU
830 F1=INT(F/8)
840 F2=INT(F-8*F1)
850 IFF1>=0THENPOKEFF-F1822 W(F2)
860 IFF1>=0THENPOKEFF-F1822 22 95
870 POKEFF+22 98+INT(F/16 01)
880 POKEFF+23 98+INT(F/1 01)-10*INT(F/16.01)
890 V=V-B
900 RETURN
910 REM VELOCITY AND HEIGHT PLOT
920 POKEX 98+INT(Y/100)
930 POKEX 1 98+INT(Y/10)-10*INT(Y/100)
940 POKEX+2 98+INT(Y)-10*INT(Y/10)
950 RETURN
960 REM VELOCITY AND HEIGHT COUNTER
970 IFX>=0THEN POKEZ X*22 W(Y)
980 IF>/0ANDX>20THENPOKEZ-X*22+22 160
990 IFX<19ANDX>=0THENPOKEZ-X*22 22 96
1000 RETURN

400M
```

COMPUTER SWAP 01-930 3266

Do you want to buy or sell a microcomputer? You can do it FREE in Computer Swap, a new regular service for *Popular Computing Weekly* readers.

All you have to do is phone Computer Swap on 01-930 3266 and give us details of your computer, the price you want for it, your name, address and telephone number.

Computer Swap entries are limited to a maximum of 30 words They will be published in the first available issue.

Popular Computing Weekly CLASSIFIED ADVERTISING

Computer Swap — Free/Private reader — 10p a word/Trade Advertisement — 20p a word/Semi-display — £5 a single column centimetre, minimum two-column centimetres

Computer Swap — buy or sell your computer for free through Computer Swap See box on left for details

Private readers — other advertisements from private readers cost 10p a word

Trade advertisements — cost 20p a word

Semi-display — why not make your advertisement more substantial by choosing the semi-display rate. It is only £5 a single column centimetre

Send your classified entries to Classified Department, *Popular Computing Weekly*, Hobhouse Court, 19 Whitcomb Street, London WC2 For semi-display enquiries call Alastair Macintosh on 01-930 3840

Here's my classified ad.

Please continue on a separate sheet of paper

I make this ...... words, at ...... per word so I owe you £ ......

Name ...

Address ...

...

Telephone ...

Command performance at 16

***David Kelly** talks to David Simons – the Commodore kid – about Simons Basic*

When David Simons presented his Vic20 Basic enhancement package to Commodore, they jumped at it They called off a team working in the US to produce a similar package for the new Commodore 64 David was commissioned instead

He is 16 years old and has been programming since his father brought home an 8K 2001 Pet — what he calls Arthur C Clarke's version — in 1978 At first David was interested in games but he soon began modifying the cassettes he bought to make them better

"That's how I got to know Basic The first game I wrote was a version of Monopoly which did everything except mortgages — with only 8K I ran out of memory I got into machine code using a Rockwell book for the Aim 65 and then had one or two things published in the *American Pet Magazine* and in the Commodore house magazine"

In the October 1980 issue of *Commodore Club News* David had a program — *Super Basic* — published which extended the Pet Basic to give it some of the facilities of the Apple including shape tables and pseudo high-resolution

Demonstration program

Shortly before the Vic20 was launched David was asked to write part of a dealer demonstration program to accompany the machine Although the work was never used, David also developed a Basic enhancement package for the Vic20 It defines in 8K a range of new commands which can be called from the keyboard "It was much more exciting to use than the Pet" he explains "Everything in the Basic is vectored, making it possible to have proper tokenised key-words To do the same thing on the Pet would have involved rewriting whole chunks of the Basic"

When he finished the software package he presented it to Commodore in Slough They took it on with the intention of marketing it for the Vic However, by March the Commodore 64 was appearing on the horizon

Plans for Commodore to produce an extended Basic Rom cartridge for the new machine were shelved and David was commissioned to convert his 8K Vic Basic for use on the Commodore 64

At this point 'O' levels interrupted the proceedings It was June before David could get down to converting the program using a Commodore 64 prototype supplied by the company

The package is now finished David has done rather more than a simple conversion — the package now occupies 16K of code

Simons Basic as it has been dubbed, can be broadly divided into three parts according to the areas of the 64 Basic which it enhances High resolution graphics and sound which at present have to be initiated by machine-code *Pokes* are both covered by Simons Basic

The package also sets up structured programming commands such as *Procedures, If Then Else* and toolkit type commands In all Simons Basic adds 110 new commands to the Basic on the 64 machine

An advantage of David's package is that, even when the system is in use 30K of programming space always remains available to the user This is because of the way it is banked in the memory over the Basic already there The standard Basic is banked in and out when an enhanced command is called and used The 8K of high-resolution screen is dumped in the 8K of memory held behind the kernal

David Simons with his Commodore 64 machine on which he developed Simon's BASIC During his three months work the machine received a tremendous battering at his hands The package is now complete but work does not stop here David is shortly to start work on a multi-tasking program

Among the sophisticated graphics commands is one to let you design your own 24 × 21 pixel characters (called a Mob) The *Mob Set* command gives you a 24 × 21 *character* array in which to build the design

Each pixel is set by a character in the array between A and D A defines the background colour and B C and D define the Mob colour — any one Mob can only display three colours Up to 256 Mobs can be defined at any time but only eight can be shown together on any one screen pixel line (switching will gets around this)

Other graphics commands include *Circle Paint Draw, Trace* and *Arc Angl* produces sectors of a circle for pie-chart applications and *Shade* colours them in

Shape allows you to define a lineshape The instruction is held as a string and different numbers plot left right up and down (eg '88887777' plots an L-shape) The *Rot* command can then be used to rotate the defined shape around any given point

Simons' Basic simplifies the music commands on the Commodore 64 All the *Poke* statements in the 64 Basic are replaced by the *Music* command which sets the notes as A to G with shift for sharps octave number and duration The *Envelope* command chooses the type of sound

The completed expansion package was handed over to Commodore on September 2 They are now checking it through before they commit it to Rom but the cartridge could possibly become available before Christmas For each of the £50 packs sold David will get a five percent royalty so he stands to become quite wealthy David is already starting work on a Commodore 64 multi-tasking program for ICI and if Simons Basic goes well he may well end up expanding it once again for use on the Commodore 510

Of the 64 machine he says "At times it is complex to use What my package does is to make some of its sophisticated capabilities easier to work with"

The nine weeks it took him to write the package were quite busy "I'd do some work on it most nights" he said "but if I had a lot of homework then I wouldn't make much progress Most of my weekends though, were spent developing it The main problem was the difficulty, with a program of this size, in seeing what I was creating Listing the code out on the printer takes more than seven hours"

Croydon Computer Fair

Croydon Home Computer Fair was held at the Greyhound Halls Croydon on Saturday September 25

Only about 2,000 people attended the show put on in this ample post-war dance hall Forty-two companies exhibited

Ron Vogt the show's organiser admitted that the gate was less than he had hoped for "We will be holding the event every year but it takes time to become established — I just wish it didn't"

John Scriven takes a look at the latest Spectrum software



From the elephants' graveyard

Although the Spectrum has only been available since July, and many people are still waiting for their box of goodies from Cambridge, it is clear that the software writers have been busy with their new machines. At the last London Microfair, there were over 50 different programs available for Sinclair's latest offering.

The programs in this review can be divided into adventure games, mazes, arcade simulations, gambling games and utility programs. Reviewing games software is never easy — what appeals to one person does not necessarily appeal to someone else. The criteria employed here, are ease of loading, clear explanation, mug-trapping, value for money and that rather subjective area, entertainment value.

There was only one adventure program *Elephants' Graveyard* (Silicon Software). You have to buy equipment for a trip into the jungle, set off with your recently hired bearers and negotiate various problems until you eventually reach the fabled pile of ivory.

Technically, this is based on Kingdom rather than Adventure, in that there is a formula that determines the outcome. Once you have found an ideal number of bearers, food packs, guns, etc, you stand a greater chance of success. The random element is supplied by the number of misfortunes that occur en route.

This appears to be a direct copy of an earlier ZX81 program and does not use the sound and graphics to any high degree, although the game itself is fairly entertaining. On the reverse of the tape is a rather weak stocking filler, *Sales*, which has the original but rather boring theme of selling ice-creams during changeable weather.

Next, the maze programs. *Green Warrior* (JWV Software) produces random mazes from 32 × 8 up to an enormous size in excess of 32 × 100. The print out option is useful to cope with this rather difficult task.

You are limited to the number of moves your little green warrior can take and this is where a small bug lies. If you fail to get round in the available moves, the same maze is redrawn. If it's particularly convoluted, it may be impossible to succeed in the permitted number of moves. You may have to break out of the program to restart the game. The maze-drawing algorithm itself, though slow, is good and will not leave you totally surrounded by hedge.

Macronics supplies *Dragon Maze*, an ingenious program that shows the whole maze only at the beginning. As you start to move, the route disappears and is revealed as you explore. Instead of a Minotaur, there is a Dragon who pursues you if you approach his corner. This is an entertaining game and uses sound and graphics well.

One of the best arcade simulations on offer is *Meteor Storm* from Quicksilva. It is written totally in machine code and is practically identical to the arcade game *Asteroids*. It even has what is described on the insert as 'speech' and certainly the loudspeaker gives a grating rasp that might be interpreted as *Meteor Storm*. On the first occasion I played this game I thought it said *Peaches and Cream* — you may decode it differently.

If you like high speed action games then you will be delighted with this opportunity to smash meteors, avoid flying saucers and hyperspace yourself over half the known universe. In some areas it surpasses the arcade original — you can 'hold' the game temporarily while you put the cat out or cook the dinner.

Several firms sell versions of *Startrek*. It is surprising that a game as long in the tooth as this one is still worth marketing. I can remember playing it in the mid-seventies at an IBM open day and the features haven't changed much. There are still the short and long range scans, energy shields, phasors and the dreaded Klingons to be zapped.

JWV Software has extended its version to cover a larger slice of the universe, different levels of play and something mysteriously called in the manual 'Romulon sabeturs'. Mr Spock never was too hot on spelling.

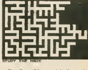
The manual is a useful accessory, and the game entertaining if you haven't played it too much before. It doesn't involve high speed finger jabbing nor even painful mental exercise — perhaps it's the ideal game when you come home from the second *Startrek* movie.

Star Dreams also provides a version that is not as involved as JWV's game but is still enjoyable to play. The advantage here is that you get another game on the reverse of the tape — *Towers of Brahma*. This is a mental problem rather than a game and consists of three posts, each one capable of supporting different sized rings. The rings are on post 1 and have to be transferred to post 3. Only one ring may be moved at a time and no ring may cover one of a smaller size.

The instructions are clear and the graphics reasonable if not amazing. You can attempt to achieve success in the minimum number of moves or to better your time. These two games make this cassette good value.

Torpedo Shoot (JWV Software) is similar to an early arcade game that relies on judgement rather than speed. There is a star filled sky and a view of a stormy sea traversed by various vessels. The object is to fire 20 torpedoes at the ships. Your base is fixed and cannot be aimed, which soon results in frustration and boredom.

The graphics are good until a ship is hit when they become rather strange, with large coloured blocks rising from the ship. If this feature were improved, it would be an average, if weak game.


STUDY THE MAZE

Star Quest (Macronics) is three mini-games in one. It involves avoiding meteors, docking a capsule and shooting retreating aliens. There is no variation in skill level and it seemed rather easy. A hardened *Defender* addict would not be impressed with this. If there were more mini-games and possibly a points system then the game would be improved greatly.

Macronics also produces a game called *Space Rescue* that proved extremely difficult to load. I was surprised at this as it was the first Spectrum cassette I have encountered that refused to load on my usual two machines. The levels seemed satisfactory, but possibly the speed of recording was



to the Towers of Brahma

not standard, as the only successful load was from a vari-speed deck This seems to be one of the few ways to fool the improved loading system on the Spectrum

Space Rescue itself is an arcade type game that involves rescuing people from the surface of a planet and transferring them to a mother ship There is a side-ways-scrolling asteroid belt that has to be negotiated between the two This is a much more professional game than *Star Quest* and would be good value if the loading were improved

Four in-a-row from JWV Software is like *Connect-4* and can be played against a partner or against the computer You drop coloured discs into an 8 × 8 frame in turns and attempt to be the first to get four of your discs in a row horizontally vertically or diagonally A younger player complained that it took too long to drop the discs but in other respects it is well written and makes a quiet change from Allen-stomping

The final action game is *Bomber* from Control Technology This is a Spectrum version of the old favourite *Blitz* which necessitates flattening a city of skyscrapers by bombing them from your aircraft which is losing height Should you succeed before crashing into a building another city rises from the ashes somewhat higher than before

Video Software s SUPERDRAW

Personally I do not enjoy games where the sole object is to zap innocent civilians, although I may be oversensitive At least Control Technology has not cashed in on recent events like some firms and given the city a Latin American name

I am surprised after seeing so many published listings that this game is still a marketable product It is not a particularly long program though this is a competent enough version and does have the advantage of on-screen scoring The main fault is that the first city is often too high to destroy and even seasoned arcade players need to get warmed up

Bomber is another cassette that is better value as it contains another game on the reverse side Since it is a gambling game, it serves to introduce the next group of programs

Fruit Machine (Control Technology) is well-written and introduced and does all you would expect except pay out real money You have £5 to start, each spin costs 10p, and there are many combinations to win There is a 'hold' facility and occasionally you can even nudge the reels The only lack of realism was its allowing me to walk away with £12 profit a most unlikely result in real life

Jack Gibbons produces a cassette called *Casino 1* that contains three different games for hardened gamblers *Blackjack Craps* and *Roulette* *Blackjack* is the totally

continued on page 22

Firm	Program		Cost	Value (1-10)
JWV Software	*Green Warrior*	(48K)	£5 00	7
138 Allington Drive	*Picture Maker*	(48K)	£4 00	2
Strood	*Star Trek*	(48K)	£7 00	8
Kent	*Torpedo Shoot*	(16K)	£4 00	4
	4-in-a row	(16K)	£4 00	7
Macronics	*Dragon Maze*	(16K)	£4 95	7
28 Spiers Close	*Star Quest*	(16K)	£3 95	4
Knowle	*Space Rescue*	(48K)	£4 95	8
Solihull			or £12 00 for	
West Midlands			the three	
Jack Gibbons	*Blackjack*	(16K)		
14 Avalon Road	*Craps*	(16K)	£4 00	9
Orpington	*Roulette*	(16K)		
Kent				
Star Dreams	*Star Trek*	(48K)		
9 Bainbridge Close	*Towers of Brahma*	(16K)	—	8
Seaford				
Sussex				
Quicksilva	*Meteor Storm*	(16K)	£5 95	9
92 Northam Road				
Southampton				
Control Technology	*Bomber*	(16K)	£5 00	8
39 Gloucester Road	*Fruit Machine*	(16K)		
Gee Cross				
Hyde				
Cheshire				
ZedXtra Software	*Character Programmer*	(16K)	£4 95	5
5 School Lane				
Kinson				
Bournemouth				
Silicon Software Ltd	*Elephants Graveyard*	(16K)	£2 95	6
24 Short Lane	*Sales*	(16K)		
Stanwell				
Middlesex				
Video Software Ltd	*Superdraw*	(16K)	£5 00	10
Stone Lane				
Kinver				
Stourbridge				
West Midlands				

Open Forum

Open Forum is for you to publish your programs and ideas
It is important that your programs are bug free before you send them in We cannot test all of them
Contributions should be sent to Popular Computing Weekly, Hobhouse Court, 19 Whitcomb Street, London WC2H 7HF

How to contribute

Each week the editor goes through all the programs that you send to Open Forum in order to find the Program of the Week

The author of that program will qualify for DOUBLE the usual fee we pay for published programs
(The usual fee is £5)

Presentation hints

Programs which are most likely to be considered for the Program of the Week will be computer printed and accompanied by a cassette

The program will be well documented, the documentation being typed with a double spacing between each line

The documentation should start with a general description of the program and then give some detail of how the program has been constructed and of its special features

Listings taken from a ZX Printer should be cut into convenient lengths and carefully stuck down on to white paper, avoiding any creasing

Please enclose a stamped, self-addressed envelope

Code Loader

on ZX81

Before you groan inwardly and turn rapidly to the next page with a mumbled "Oh no, not another one!" let me assure you that this one really is a big improvement on the ones you may have seen before

Nearly all the loaders I have come across that store the data in the first line in a *Rem* statement require you to previously type in as many characters of rubbish as there are bytes of machine code The loader then pokes the code you type in into this statement This makes it very difficult to check and correct the program

This program gets around this problem by 'reading' the machine code instructions in the first *Rem* statement converting these into character codes and poking the converted codes back into the same statement

To use the program, type all the lines except 10 and 20 Into line 10 type your machine code separated by commas or spaces in decimal If you prefer to type in Hex change the '*10 in line 90 to '*16 Check and edit the code as required

When you are satisfied it is correct use *Edit* to copy it into line 20 Then run the program If required, save the program at this point To run the machine code program use the Instruction *Rand Usr* (16514) If the program is incorrect just copy line 20 into Line 10 and correct it

The program uses the fact that the character code for numbers 0 to 9 and characters A to F are in sequence and lie between 28 and 43 (lines 80 & 90) Line 150 checks for an end of line character

```
BEFORE RUNNING THE PROGRAM...
  10 REM 33 130 64 17 0 32 1 0 1
201
  20 REM 33 130 64 17 0 32 1 0 1
201
  30 LET C=0
  40 LET L=16514
  50 LET P=L
  60 LET B=PEEK L
  70 LET L=L+1
  80 IF B<28 OR B>43 THEN GOTO 1
20
  90 LET C=C*10+B-28
 100 GOTO 60
 120 POKE P,C
 130 LET P=P+1
 140 LET C=0
 150 IF B<>118 THEN GOTO 60
 160 LIST

...AFTER RUNNING THE PROGRAM WE
GET

  10 REM [illegible] 4* *TAN  7 0 32
1 0 1 201
  20 REM 33 130 64 17 0 32 1 0 1
201
  30 LET C=0
  40 LET L=16514
  50 LET P=L
  60 LET B=PEEK L
  70 LET L=L+1
  80 IF B<28 OR B>43 THEN GOTO 1
20
  90 LET C=C*10+B-28
 100 GOTO 60
 120 POKE P,C
 130 LET P=P+1
 140 LET C=0
 150 IF B<>118 THEN GOTO 60
 160 LIST
```

Code Loader
by Nigel Vandyk

Spelling

on ZX81

This program runs on a 16K ZX81 and could easily run on a Spectrum with the minimum of changes It was written for a remedial group at a primary school and has proved quite successful

The user is asked to input ten words up to fifteen letters long and then find somebody to try them out on The child has two goes to get the word right then the incorrect word is placed next to the right word at the end of the test You also can choose a speed in which the child has to pit its wits against

The word is flashed on the screen for the defined amount of time The program then starts again at line 60

Program notes

10=variable
50 to 68=inputs name and speed
69 to 89=sets up screen
92 to 180=tests child and checks for correct answer
181 to 185=gives child another go if necessary
220 to 247=prints score and copies it on to printer
300 to 317=inputs words for testing

```
   1 REM *COPYWRITE BRUCE POPLE*
   2 REM *SPELLING TEST 18-8-82*
  10 LET A=0
  20 GOSUB 300
  60 PRINT "WHAT IS YOUR NAME?"
  61 REM *GO AND GET A TEACHER*
  65 INPUT N$
  66 PRINT AT 0,11,"TYPE IN SPEE
D,  1 IS FAST,  5 IS QUITE
FAST,  10 IS SLOW"
  67 PRINT AT 0,0,
  68 INPUT I
  70 LET A=0
  71 CLS
  79 PRINT "HELLO ";N$;"  LOOK
AT THIS WORD THEN SPELL IT YOURS
ELF"
  80 PAUSE 300
  81 FOR N=1 TO 3
  82 SCROLL
  83 NEXT N
  84 CLS
  85 PRINT
  86 CLS
  92 LET I=I*10
  93 REM *GO AND GET A TEACHER*
 110 DIM B$(10,14)
 120 FOR N=1 TO 10
 121 LET U=0
 130 CLS
 133 PRINT A$(N)
 140 FOR M=1 TO I
 150 NEXT M
 160 CLS
 170 INPUT B$(N)
 180 IF B$(N)=A$(N) THEN GOTO 20
0
 181 LET U=U+1
 182 IF U=1 THEN PRINT "BAD LUCK
 ";N$;"  TRY AGAIN"
 183 IF U=1 THEN PAUSE 200
 184 IF U=1 THEN GOTO 130
 185 NEXT N
 186 REM *GO AND GET A TEACHER*
 187 GOTO 220
 200 LET B$(N)="CORRELT"
 210 NEXT N
 220 CLS
 221 PRINT
 222 PRINT "THIS WAS YOUR SCORE
";N$
 223 PRINT
 230 FOR N=1 TO 10
 240 PRINT A$(N),"= ";B$(N)
 244 NEXT N
 245 COPY
 246 INPUT U$
 247 CLS
 250 GOTO 60
 300 PRINT "INPUT 10 WORDS WITH
THE MAXIMUM  OF 14 LETTERS FOR T
HE PUPILS"
 302 DIM A$(10,14)
 304 FOR N=1 TO 10
 306 INPUT A$(N)
 308 NEXT N
 311 PRINT
 312 FOR N=1 TO 10
 313 PRINT A$(N)
 314 NEXT N
 315 PAUSE 300
 316 CLS
 317 GOTO 60
```

Spelling
by Bruce Pople

Vaniahing Coda

on ZX81

This describes a programming hint for the deletion of large quantities of Basic code on the ZX81

I was faced with the task of either entering a very large machine code storage *Rem* or loading a very big program that contained the *Rem* and deleting all the Basic I decided on the latter, and set out to find a way of deleting all the Basic at a single stroke It proved extremely simple

I found that all Basic lines end in a byte 118 followed by a zero byte and that the program ends with two 118 bytes If one develops a method of determining which byte to poke with 118 following a previous 118 the effect is to delete all the code that followed The two lines of Basic below will allow one to do this

Line 100 is an all-purpose line that may be placed anywhere in the program. When this is RUN the code immediately following the line is deleted TO THE END OF THE CODE

Line 100 computes the NXTLIN address & pokes 118 into it, which is adjacent to the byte 118 at the end of the previous line of code

Line 200 may be entered as a direct command to delete ALL code except the first line This is the line I used to delete my huge Basic program leaving me with the machine code I wanted to 'borrow' and no aching fingers or boggle eyes

```
100 POKE (PEEK 16420+256*PEEK 16421),118
200 POKE (16509+(PEEK 16511+256*PEEK 16512)+4),118
```

Vanishing Code
by Paul Newman

Martians

on Vic 20

This is an arcade game with a difference You, a Martian are seeking revenge on those nasty humanoids who used to shoot you down in pubs and clubs You have four lives and if you shoot down all the men the game starts again but you have less chance of survival Be careful not to shoot an arm or you lose points!

The game fits in 3.5K, with room for small adjustments if you wish Full instructions are included in the program

The main program variables are
RN define how often the men fire at you
SC your score (10 points per man)
KY the keyboard buffer peek (197)
SP your base position (starts at zero)
FG equals one when you are firing
GF equals one when the men are firing
LL lives left (you have four per game)
PE men left to shoot

The program uses a keyboard *Peek* rather than a *Get* statement as it is faster and allows for repeats

Program notes
1 *Goto* subroutine to print instructions
10 Set screen colour volume and code keyboard buffer
20 Define variables
30 100 Set up screen shields men and your base
105-109 Test to see if you are firing or the men are and adjust screen accordingly
110-120 Check for keys.
140 *Goto* line 100 to let men shoot
160-130 Define bullet starting position from men
1000 1050 Clear code of screen and minus one life If all lives gone then print game over and restart.
2000-2010 Define bullet starting position from your base
3000-3030 Wipe men off screen after moving his arms and adjust score If no men left then start again with increased difficulty
4000-4040 Print game over routine and restart.
4060 Adjust difficulty of game and restart.
10000-11400 Instructions etc

Peculiar Program

on Spectrum

This program demonstrates a very odd feature of the Spectrum It produces a very unusual screen effect, but I am not sure exactly how! Using a small machine-code routine stored in the user-definable graphics area, the Interrupt Vector, I is altered from its usual value of 63 to 64 (In fact, any value from 64 to 127 can be used)

On its own, this produces a slight picture break up, as the ULA becomes confused When a *Pause* statement is executed very strange effects occur — sometimes the display is normal, sometimes each character is repeated and other times a fruit-machine effect occurs To restore normality when running the program press *Break* then *Goto* 100 The only real use of this program I can think of is to produce an impressive explosion effect, if line 60 is altered to *Pause* 0

```
 10 FOR I=USR "A" TO USR "A"+4
 20 READ A: POKE I,A
 30 NEXT I
 40 INK 0: LIST: INK RND*6: LIST
 50 RANDOMIZE USR USR "A"
 60 PAUSE 20: GO TO 60
 70 DATA 62 64 237 71 201
100 POKE USR "A"+1,63
110 RANDOMIZE USR USR "A"
```

by Andrew Pennell

```
1 GOSUB10000
2 RN=7
10 POKE36879,43:PRINT"[illegible]":POKE36878,15:POKE198,0
20 SC=0:KY=197:SP=0:FG=0:LL=4:PE=8
30 A$="[illegible]"
40 PRINT"[illegible]"
50 FORK=1TO6:PRINTA$;"[illegible]":NEXTK
70 PRINT"[illegible]"
80 FORN=1TO4:PRINT"[illegible]":NEXTN
88 B$="[illegible]"
90 FORX=0120TO8141:POKEX,160:POKEX+30720,2:NEXT
100 PRINT"[illegible]"TAB(SP)"[illegible]"
105 IFFG=1THENPOKEXX,93
106 IFFG=1THENIFPEEK(XX+22)=102THENPOKEXX,32:POKEXX+22,93:POKEXX+22,32:FG=0
107 IFFG=1THENIFPEEK(XX+22)=112ORPEEK(XX+22)=112ORPEEK(XX+22)=118THENGOSUB1000
108 IFGF=1THENPOKEFI,93
109 IFGF=1THENIFPEEK(FI)=160THENPOKEFI,93:POKEFI,32:GF=0
110 KL=PEEK(KY)
115 IFKL=43ANDGF=0THENGOSUB2000
120 IFKL=19THENSP=SP-1:IFSP<0THENSP=1
130 IFKL=20THENSP=SP+1:IFSP[illegible]THENSP[illegible]
131 PRINT"[illegible]";SC;PRINT"[illegible]LIVES";LL
132 IFGF=1THENPOKEFI,32:FI=FI[illegible]:IF[illegible]THENGF=0:POKE36877,0
133 IFGF=1THENIFPEEK(FI)=[illegible]THEN[illegible]:GF=0:POKE36877,0
134 IFGF=1THENIFPEEK(FI)=221THENGOSUB3000
135 IFGF=1THENIFPEEK(FI)=160ORPEEK(FI)=118THENGF=0:
HGHSL=0:POKE36877,0:SL=SC-10:IFSC<0[illegible]
139 IFFG=1THEN145
140 IFRND(1)>RN/10THEN160
145 IFFG=1THENPOKEXX,32:XX=XX+22:IFXX>8120THENFG=0
150 GOTO100
160 XX=7870
170 HH=INT(RND(1)*[illegible])
175 IFPEEK(XX+(HH*3)-22)<>221THEN170
180 XX=XX+(HH*3):FG=1:GOTO100
1000 POKEXX,32:POKEXX+22,[illegible]:POKEXX+22,32
1010 POKEXX+22,80
1020 POKE36877,150
1030 FORK=1TO50:NEXTK
1040 POKE36877,0
1050 FG=0:LL=LL-1:IFLL=0THEN4000
1060 RETURN
2000 FI=8009+SP-22+1
2010 GF=1:POKE36877,254:RETURN
3000 POKE36877,200
3005 FORK=1TO50:NEXTK:POKE36877,0
3010 POKEFI,23,130:POKEFI,21,120
3020 SC=SC+10
3025 GF=0:POKE36877,0:PE=PE-1:IFPE=0THEN6000
3036 FORK=1TO50:NEXTK
3037 POKEFI,32:POKEFI-22,32:POKEFI-44,32:POKEFI-23,32:POKEFI-21,32
3040 RETURN
4000 POKE198,0:FORV=1TO5
4001 POKE36878,170
4004 PRINT"[illegible]GAME OVER"
4005 FORK=1TO500:NEXTK
4006 POKE36878,200
4010 PRINT"[illegible]GAME OVER"
4020 FORK=1TO200:NEXTK
4030 NEXTV
4032 POKE36878,0
4035 PRINT"[illegible]     PLAY AGAIN?"
4036 GETA$:IFA$=""THEN4036
4037 IFA$="Y"THEN2
4038 IFA$="N"THENPRINT"[illegible]BYE!":POKE36879,27:END
4039 GOTO4036
4040 GOTO10
6000 CLR:RN=RN-1:GOTO10
10000 POKE36879,[illegible]5
10010 PRINT"[illegible]MARTIAN'S REVENGE[illegible]"
10020 PRINT"IS THE GAME UNLIKE"
10030 PRINT"MANY INVADER TYPES "
10040 PRINT"AS U THE MARTIANS MUST"
10050 PRINT"ELIMINATE THE HUMANS"
10060 PRINT"AS YOU SEEK REVENGE "
10070 PRINT"YOU MUST SHOOT DOWN"
10080 PRINT"THE NASTY HUMANOIDS"
10090 PRINT"BEFORE THEY EVENTUALLY";
10100 PRINT"KILL YOU BEING A"
10200 PRINT"MARTIAN HOWEVER YOU"
10300 PRINT"HAVE [illegible] LIVES!"
10400 PRINT" NOT TO BE WASTED!"
10500 PRINT"[illegible]HIT A KEY"
10600 GETA$:IFA$=""THEN10600
10700 PRINT"[illegible]YOU MOVE BY"
10800 PRINT"[illegible]-LEFT"
10900 PRINT"[illegible]-RIGHT"
11000 PRINT"[illegible] TO FIRE "
11100 PRINT"[illegible]GET READY AND"
11200 PRINT"HIT ANY KEY!"
11300 GETA$:IFA$=""THEN11300
11400 POKE198,0:RETURN
```

Mertians
by John Coun

Night Bomber

on Vic-20

This program runs on an unexpanded Vic20 in a meagre 1.6K. To play the game you first select your difficulty level and air speed (ie the heights of the buildings and length of delay loop). The computer then designs a cityscape which your jet must demolish.

You do this by using bombs (to drop press "F7") and missiles ("F5"). There is an unlimited supply of bombs but only three air-to-air missiles. Each section of building destroyed scores one point, missiles however, are an emergency measure and score no points.

The program is easily adapted to become easier or harder. For instance, by changing lines:
505 Range of missile (here = 10)
240 The odds of destroying the "next section" of building (here 1 in 6)
80 The heights of the buildings (here the minimum is 1 to a maximum of 17!)

Program notes
Lines
55-120 — design the cityscape
160-200 — move the plane
146 + 215 — move the bomb
140, 170 and 510 colour the plane, bomb and missiles
500-580 — is the missile subroutine.

The main variables used are:
X — Main loop variable
N — Main delay variable
B — Position of bomb
S + T — Control the shape of the bomb and the noise it makes while dropping
V — Controls the amount of damage each bomb does
D + E — Are the difficulty level and airspeed level

The basic program is very simple and easily expanded and modified. You are advised to start on level one first and then progress, or else you'll be in for a shock.

```
10 POKE36879,110 POKE36878,15 HS=0
20 PRINT"J■     NIGHT BOMBER■■          BY"
25 PRINT"    PETER M BARTLEY"
30 PRINT"■■■■PLEASE TYPE LEVEL OF"
35 INPUT"DIFFICULTY (1-9)",D IFINT(D)<1ORINT(D)>9THEN35
40 INPUT"■■■AIRSPEED (5-1)",E E=INT(E) IFE>5ORE<1THEN40
45 M=3 T=1 S=39 SC=0
50 REM#BUILD CITYSCAPE
55 POKE36879,8 PRINT "J"
60 FORZ=0TO21
65 H$="■■■■■"
70 PRINTMID$(H$,INT(RND(1)*8)+1,1)"■■■■■■■■■■■■■■■■■■■■■■"
80 FORY=1TOINT(RND(1)*(8+D))
90 PRINTTAB(Z) "■■"
95 POKE36876,212+Z+Y
100 NEXTY
105 PRINT"■I"
110 NEXTZ
120 POKE36876,0 FORN=1TO500 NEXTN
125 REM#MAIN LOOP
130 FORX=1TO472
140 IFB>0THENPOKE(38422+X+B),4
145 IFB>0THENPOKE(7702+X+B),S
150 IFB>0 AND T>0 THEN POKE36876,250-T
155 FORN=1TO(E-1)*10 NEXTN
160 POKE7701+X,32
170 POKE38424+X,1
180 POKE7702+X,252
190 POKE7703+X,121
200 POKE7704+X,82
205 IFB>0 THEN POKE36876,0
210 POKE36877,0
215 IFB>0THENPOKE(7702+X+B),32
220 IF7724+X+B>8163THENB=0 S=39 T=1
230 IFPEEK(7705+X)<>32THEN410
235 REM# STRENGTH OF BUILDING
240 IFB>0ANDPEEK(7724+X+B)=160THENV=INT(RND(1)*6)+1 S=86
SC=SC+1 T=-1 POKE36877,192+V*10
250 IFV=2THENB=0 V=0 S=39 T=1
260 GETB$
270 IFB$="■"ANDB=0THENB=1
280 IFB$="■"ANDM>0THENH=1 M=M-1 GOSUB500
290 IFB>0THENB=B+21 T=T+1
300 PRINT"■■SCORE ■ SC"■■■■■■■■■■■■■MISSILES ■"M
305 NEXTX
310 REM#SUCCESS
315 FORN=1TO1000 NEXT
320 FORN=1TO30
325 PRINT
330 POKE36877,200+N
335 NEXTN
340 POKE36877,0
345 PRINT"■■GOOD LANDING-WELL DONE"
350 REM#SCORE
360 PRINT"■■■YOUR SCORE WAS "SC
365 IFSC<HSANDHS>0THEN380
370 HS=SC PRINT"■■YOU HAVE THE HIGHSCORE"
375 INPUT"TYPE YOUR INITIALS",N$ N$=LEFT$(N$,3)
380 PRINT"■■"N$" HAS THE HIGHSCORE WITH"HS
385 PRINT"■■PRINT YOUR LEVEL       ■S=SAME■■■■■■■■H=
HIGHER(BY ONE)"
390 GETV$:IFV$="" THEN390
395 IFV$="S"THEN45
400 IFV$="H" ANDD<9THEND=D+1 GOTO45
405 GOTO390
410 REM#FAILED
415 POKE36879,24 F=46 G=0 H=-2 I=0
420 FORN=FTOGSTEPH
425 POKE36877,200+N POKE36863,N FORK=1TO50 NEXT
430 POKE36877,0
435 NEXTN
440 PRINT"J■YOU CRASHED-TOUGH LUCK"
455 I=I+1 IFI=1THENF=0 G=46 H=2 GOTO420
460 GOTO360
500 REM#MISSILES
505 FORJ=250TO150STEP-10
510 POKE38424+H+X,2
520 POKE7704+H+X,82
530 POKE36877,J POKE36876,J
540 POKE7704+H+X,32
550 H=H+1
560 NEXTJ
570 POKE36877,0 POKE36876,0
580 RETURN
```

Night Bomber
by Peter Bartley

```
10 DIMC$(10),DA(10),DB(10),DC$(10)
20 C$(0)="BLACK" C$(1)="BROWN" C$(2)="RED" C$(3)="ORANGE" C$(4)="YELLOW"
30 C$(5)="GREEN" C$(6)="BLUE" C$(7)="PURPLE" C$(8)="GREY" C$(9)="WHITE"
42 DC$(0)="" DC$(1)="0" DC$(2)="00" DC$(3)="000" DC$(4)="0000" DC$(5)="00000"
43 DC$(6)="000000" DC$(7)="0000000" DC$(8)="00000000" DC$(9)="000000000"
70 PRINT"J■■■■ENTER RESISTANCE"
75 PRINT"■■■               ■"
80 INPUTDA
90 INPUTDB
100 INPUTDC$
110 PRINT"■■■■1ST BAND- "C$(DA)
120 PRINT"■■■■2ND BAND- "C$(DB)
130 PRINT"■■■■3RD BAND- "C$(LEN(DC$))
140 PRINT"■■■■ANOTHER RESISTOR?- Y/N■"
150 GETA$ IFA$=""THEN150
152 IFA$<>"Y"THENSTOP
155 CLR
160 GOTO10

READY.
```

Resistor
by Richard Barton

Resistor

on Vic

Type in the resistance required, each digit other than zeros being followed by return. Enter zeros together — and return. The program will then show the colour-code for that resistance.

Dissasembler

on BBC Micro

I have written an interesting program on my BBC micro to enable users to see what is going on inside the memory of their micro. I have written it on a Model B, but since it is very short and uses Mode 4 it will run on a Model A.

The variables used are

X% the start of the current block of eight 'peek addresses
A% a looping variable
CHAR an array used to store each block of eight contents of peek addresses

I have used an internal variable to create field size and have defined it as being 3 (see manual pp 70-72)

Program

```
10 MODE 7 P TAB(5,5) CHR$141
   DISSASSEMBLER
20 P TAB(5 6) CHR$141  DISSASSEMBLER
30 P TAB(7 7) ————"
40 This program is designed to enable the      " user
   to read parts of the memory         in particular the
   BASIC interpreter        which starts at address
   32768       " To stop the listing at any one point
         press <CTRL> and <SHIFT>
50 P  at the same      "time
60 I      STARTADDRESS  X%
70 MO 4
80 VDU23 255 255,255 255 255 255 255,255 255
90 @%=&00203
100 P
110 DIM CHAR(8)
120 P  ~X% "
130 IF INKEY(0)=ABC  A  RUN REM PRESS  A TO
    ABORT AT ANY TIME
140 *FX15 1
150 FOR A%=X% TO X%+7
160 CHAR(A%-X%)=?A%
170 IF CHAR(A%-X%) 16 P ,  ",
180 P ~CHAR(A%-X%)
190 NEXT
200 P      FOR A%=0 TO 7
210 IF CHAR(A%)>32 THEN P CHR (CHAR(A%) )
    ELSE P    ,
225 NEXT A%
255 X%=X%+8
260 GOTO 120
```

by Tim Zobel

```
  5 REM** e,by A. Tennant August '82 **
 10 MODE7
 20 INPUT"HOW MANY PLACES OF DECIMALS DO YOU
       REQUIRE ",P
 30 P%=P+4
 40 DIMA%(P%+1),B%(P%+1):B%(1)=1
 50 F%=0:N%=0:J%=1:T%=10:R%=0:Z%=0
 60 REPEAT:N%=N%+J%
 70 FORI%=J%TOP%
 80 B%(I%+J%)=B%(I%+J%)+(B%(I%) MOD N%)*T%
 90 B%(I%)=B%(I%) DIV N%
100 NEXTI%
110 FORI%=P%TOJ%STEP-J%
120 S%=A%(I%)+B%(I%)
130 IFS%<T% F%=Z% ELSE F%=J%:S%=S%-T%
140 A%(I%)=S%
150 NEXTI%
160 IF?215=226 PROCTYP
170 PROCACC:IFR%=J% VDU7:PRINT;''"e to "P"
places":PROCTYP:END
180 UNTIL FALSE
190 DEFPROCACC
200 R%=J%
210 FORI%=P%TOJ%STEP-J%
220 IFB%(I%)<>Z% I%=J%:R%=Z%
230 NEXTI%
240 ENDPROC
250 DEFPROCTYP:PRINT;'"2.";
260 FORI%=J%+J%TOP+J%
270 PRINT;A%(I%);
280 NEXTI%
290 PRINT''
300 ENDPROC
```

Calc
by Alan Tennant

Calc

on BBC Micro

This program, written for the BBC micro (A or B), will calculate the numerical value of "e" to any required number of decimal places The maximum number of decimal places is restricted by the amount of memory available

After entering the number of places you require there will be a delay while the computer calculates the correct value During this period the user can get a display of the current — inaccurate — value by holding down the space bar

The program makes use of the converging series

e=1/0!+1/1!+1/2!+1/3!+1/4!+

All the arithmetic is done in a longhand fashion using the arrays A% and B% to give the large number of decimal places Lines 60 to 100 calculate the successive terms in the series each new term being held in the array B%

Lines 110 to 150 then add this new term to the current sum in the array A%

Line 160 checks whether the space bar has been pressed

Line 170 calls *Procacc* and if R%=1 (value accurate) calls *Proctyp* to print the value

Procacc is defined in lines 190 to 240 and sets the flag R% to one when every term in B% is zero

Proctyp, defined in lines 250 to 300, prints the current approximation of 'e' held in A%

Klingon

on Spectrum

By cunning and stealth wa the Klingon race have constructed a very special installation on the planet Grool The Federation is sending ships from every Star base in this sector to attempt to destroy it

It is your task to prevent them from doing so We will supply you with seven ships and unlimited ammunition We have sent out distress calls to all Klingon outposts and expect reinforcements to arrive at any time (In other words you get a bonus ship every 250 points) Should you succeed in destroying all the Federation Starships, (reach a score of 2,000 points) you will receive a substantial promotion, as well as the gratitude of the entire Klingon people, if you fail you will of course be killed

Program notes

The Starship in lines 150, 155, 690 985 and 1200 is made up of the graphic characters 'S' "H , ' P

The Klingon ship in lines 120 190 210 and 1580 is made up of the graphic characters ' T", "K '

Line(s)	Effect
5	This pokes the caps shift on
10 to 70	Introduction and option for instructions
32 to 90	Select level of difficulty
100 to 260	Main loop (printing and unprinting of ships reading the keys)
270 to 550	Initialisation (defining the graphic characters plotting the stars drawing the planet etc)
988 to 870	Klingon photon fire
940	Awards a bonus ship if score is a multiple of 250 points
950	Checks if your score has reached 2,000 points yet
980 to 1030	Increases 1 (enemy landed) by one if this makes 1=7 control passes to 1120 otherwise sounds alarm and resets Starship
1130 to 1236	The plant is destroyed (quite spectacularly)
1240 to 1310	Play again option
1320 to 1500	Instructions
1510 to 1560	Play Beethoven s 5th symphony (well sort of)
1588 to 1898	Bonus ship subroutine
1610 to 1710	Hey! you won

When the program is run you will see your ship cruising above the planet in a starry sky The enemy Starships will approach from the left and must be shot before they reach the planet s surface

You move using the 7 and 6 keys and fire using the 0 key If your ship is destroyed, a replacement (assuming that

to next page

PROGRAM OF THE WEEK

you have any left) will fly in from the fleet shown in the top left of the screen

When either all your ships are destroyed or seven enemy craft have penetrated your defences the plant on the planet's surface will explode and the game will be over. If you can make it to two thousand points then you have won, and will be treated with all the respect due to a true war hero

```
You are entrusted with the
defence of the nuclear plant
on the planet Grebl.

The Federation is determined
to destroy this plant at any
cost, especially that imbecile
Kirk.

Your ships controls are -
7  To go up
6  To go down
0  To blow seven bucks...(sorry)
   To fire photon beam
You have 7 defence craft, and
our ground forces can withstand
up to 7 landings.(Press any key)
```

Wannanuvvergo?

(y or n)

KLINGON DEFENCE
(cting on de fence)

```
THEN GO TO 83
 89 LET ef$=CODE e$-a0
 90 GO TO 270
100 IF INKEY$="7" AND x>1 THEN
LET x=x-1
110 IF INKEY$="6" AND x<20 THEN
LET x=x+1
120 IF c>=0 THEN PRINT AT x,25,
 ,AT x+1,25;   ,AT x-1,25;" "
130 IF INKEY$="0" THEN GO TO 88
0
140 PRINT AT a,h; INK 7; OVER 1
[illegible]
150 PRINT AT a,h+1; OVER 1; INK
7;[illegible]
160 PRINT AT a,h; INK 0; OVER 1
[illegible]
170 IF x<>a OR RND>=s/f/3 THEN
GO TO 240
175 BEEP .3,-30: BEEP .1,20: PR
INT AT a,0; INK 7; OVER 1;[illegible]
[illegible]
270 POKE USR "[illegible]",0
280 POKE USR "[illegible]"+1,0
290 POKE USR "[illegible]"+2,BIN 00001111
300 POKE USR "[illegible]"+3,BIN 00001010
[illegible]
1160 DRAW r,-RND*[illegible]
1170 BEEP .05,30
1180 NEXT r
1190 INK 7: PAPER [illegible]
1200 LET a$=" GROOL HAS FALLEN--"
[illegible]
1300 CLS
1310 STOP
1320 CLS
1330 PRINT " You are entrusted
with the  ","defence of the nucle
ar plant  ","on the planet Grebl."
1340 PRINT
1350 PRINT " The Federation is d
etermined","to destroy this plan
t at any ","cost, especially that
 imbecile","Kirk."
1360 PRINT
1370 PRINT " Your ships controls
 are -"
1380 PRINT
1390 PRINT "  7 To go up"
1400 PRINT
1410 PRINT "  6 To go down"
1420 PRINT
1430 PRINT "  0 To blow seven buc
ks...(sorry)"
1440 PRINT
1450 PRINT "    To fire photon be
am"
[illegible]
1500 PRINT AT 21,17;"(Press any
key)"
1510 LET i=-3
1520 PAUSE 0
[illegible]
1700 IF INKEY$="y" THEN GO TO 10
1710 STOP
```

```
 0>REM [illegible] Gary Kennedy 1983
 10 POKE 23609,0
 20 INK 7: PAPER 1: BORDER 1
 30 CLS
 40 PRINT AT 3,6; INVERSE 1;" K
LINGON DEFENCE "
[illegible]
```

Klingon
by Gary Kennedy

Basic monitor
on Spectrum

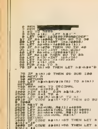
This is a program for machine code programmers in which they can enter data in hex. First select the address to where the program is to be entered and then use normal hex numbers to enter data. The address and data are displayed in both hex and decimal. A hex to decimal and a decimal to hex converter is also provided.

The program displays a menu and uses single key strokes to select various modes. Two hex numbers for each byte must be entered.

5-3635 is the conversion routine

4000 prints the display which is then followed by the main loop

To next page



```
1 REM [redacted]
2 REM [redacted]
4 GO TO 4000
5 DIM a(4): LET h$=""
6 LET V$="0123456789ABCDEF"
17 IF no<4096 THEN GO TO 30
20 LET a(1)=INT (no/4096)
25 LET no=no-(4096*a(1))
30 IF no<256 THEN GO TO 40
35 LET a(2)=INT (no/256)
40 LET no=no-(256*a(2))
45 IF no<16 THEN GO TO 55
50 LET a(3)=INT (no/16)
55 LET no=no-(a(3)*16)
60 LET a(4)=no
65 FOR n=1 TO 4
70 IF a(n)=0 THEN LET h$=h$+"0"
75 IF a(n)>0 THEN GO SUB 100
80 NEXT n
90 RETURN
100 LET h$=h$+V$(a(n) TO a(n)):
RETURN
500 REM HEX TO DECIMAL
505 POKE 23658,8
1000 DIM a(4): DIM a$(4,2)
2000 FOR n=1 TO 4
2005 LET a$(n)=h$(n TO n)
2010 IF CODE a$(n)>57 THEN GO SU
B 3000
2015 NEXT N
2020 LET no=VAL A$(1)*4096
2025 LET no=no+(VAL A$(2)*256)
2030 LET no=no+(VAL A$(3)*16)
2035 LET no=no+VAL A$(4)
2040 RETURN
3000 IF CODE a$(n)=65 THEN LET a
$(n)="10"
3005 IF CODE a$(n)=66 THEN LET a
$(n)="11"
3010 IF CODE a$(n)=67 THEN LET a
$(n)="12"
3020 IF CODE a$(n)=68 THEN LET a
$(n)="13"
3025 IF CODE a$(n)=69 THEN LET a
$(n)="14"
3030 IF CODE a$(n)=70 THEN LET a
$(n)="15"
```

```
3035 RETURN
3999 LET ADDRESS=0
4000 LET FLAG=-1: POKE 23658,8:
LET NO=ADDRESS: GO SUB 5: LET B$
=H$
4050 CLS: PRINT AT 0,0;"I=Incre
ment Address  D=Decrement Addr
ess  Z=Stop  N=New Address"
  H=Hex Converter   R=Run
4051 PRINT AT 11,0;"____________";AT 21,0;"____"
4052 PRINT AT 13,3;"Address";AT
13,21;"Data";AT 15,0;"Hex=";AT 2
0,0;"Dec="
4054 LET DATA=PEEK ADDRESS: LET
NO=DATA: GO SUB 5: LET D$=H$(3 T
O 4)
4055 PRINT AT 15,5;B$;AT 15,22;D
$;AT 20,5;ADDRESS;"  ";AT 20,
21;DATA;"  "
4060 PAUSE 1: LET G$=INKEY$: IF
G$="" THEN GO TO 4060
4062 BEEP .1,20
4065 IF G$="I" THEN GO TO 4100
4067 IF G$="D" THEN GO TO 4150
4069 IF G$="Z" THEN STOP
4071 IF G$="N" THEN GO SUB 4200
4073 IF G$="H" THEN GO TO 4300
4075 IF G$="R" THEN GO TO 4400
4077 IF (CODE G$>47) AND (CODE G
$<58) OR (CODE G$>64) AND (CODE
G$<71) THEN GO SUB 4500
4080 GO TO 4050
4100 LET ADDRESS=ADDRESS+1
4105 LET NO=ADDRESS: GO SUB 5
4110 LET B$=H$
4115 GO TO 4054
4150 LET ADDRESS=ADDRESS-1
4152 IF ADDRESS=-1 THEN LET ADDR
ESS=0
4155 LET NO=ADDRESS: GO SUB 5
4160 LET B$=H$
4165 GO TO 4054
4200 INPUT "4 Digit Hex No. ";h$
4205 IF LEN h$<>4 THEN GO TO 420
0
4210 LET h$=h$: GO SUB 500: LET
ADDRESS=no: GO TO 4054
4300 CLS: PRINT "   HEX/DEC  DEC
/HEX CONVERTER"
4302 PRINT AT 20,0;"Hex H or Dec
D"
4305 PAUSE 1: LET G$=INKEY$: IF
G$="D" THEN GO TO 4315
4306 IF G$="H" THEN GO TO 4350
4310 GO TO 4305
4315 PRINT AT 20,0;"   ": INPUT "De
cimal number please ";dec: LET n
o=dec: GO SUB 5: PRINT AT 15,3;"
Dec ";dec;" = Hex ";h$
4320 PRINT AT 19,0;"Another (Y)"
4325 PAUSE 1: LET G$=INKEY$: IF
G$="Y" THEN GO TO 4310
4326 IF G$="" THEN GO TO 4325
4330 GO TO 4000
4350 PRINT AT 20,0;"   "
4355 INPUT "4 Dig hex No Please
";h$
4356 IF LEN h$<>4 THEN GO TO 435
5
4358 GO SUB 500: PRINT AT 15,3;"
Hex ";h$;" = Dec ";no
4359 PRINT AT 19,0;"Another(Y)"
4360 PAUSE 1: LET G$=INKEY$: IF
G$="Y" THEN GO TO 4350
4362 IF G$="" THEN GO TO 4360
4365 GO TO 4000
4400 CLS: INPUT "Hex Run Address
";r$
4405 IF LEN r$<>4 THEN GO TO 440
0
4410 LET h$=r$: GO SUB 500
4415 LET r=USR no
4420 GO TO 4000
4500 LET FLAG=FLAG*-1
4505 IF FLAG=1 THEN LET D$=G$+D$
(2)
4510 IF FLAG=-1 THEN GO SUB 4550
4515 RETURN
4550 LET D$=D$(2 TO 2)+G$: LET D$=D
$+G$
4555 LET H$="00"+D$: GO SUB 500
4560 LET DATA=NO: POKE ADDRESS,D
ATA: RETURN
```

Basic Monitor
by John Walsh

Better than Basic



Can you program in a computer language other than Basic?

Enter this challenging new competition and win a Jupiter Ace.

Basic, for all its advantages, is slow. Programs written in Basic tend to look rather pedestrian when compared to programs written in some other languages such as machine code.
We want something different, something faster than Basic. It could be machine code, Forth, Lisp, Pascal or Fortran. In fact, your entry can be written in anything that is not Basic. And the best non-Basic program, be it game, utility or other, will win the Jupiter Ace.

The entries will be judged by *Popular Computing Weekly* editor, Brendon Gore, and Jupiter Ace designers Richard Altwasser and Steve Vickers. In their selection account will be taken both of the standard of the program and of the accompanying documentation. The whole range of languages and types of program are allowed. The only stipulation is that it must not be written in Basic.

Entries to the award scheme must be accompanied by four of the numbered coupons published in *Popular Computing Weekly* throughout October. The closing date for the competition is November 18. The winning entry will be announced in the issue published on December 23.

Rules

1. *There is no limit on the number of entries you can send in, but each entry must be accompanied by four differently numbered competition coupons.*
2. *Closing date for entries is November 18 1982*
3. *The names of the winners will be announced in the December 23 issue of Popular Computing Weekly*
4. *The Judges' decision is final*
5. *No employees of Sunshine Publications Ltd or their families, will be eligible to enter the competition*

Popular Computing Weekly
Better than Basic Competition

NAME ____________________

ADDRESS ____________________

Fill in this coupon. When you have collected four differently numbered coupons, send them with your program to: *Popular Computing Weekly* Better than Basic, Hobhouse Court, 19 Whitcomb Street, London WC2.

③

Line-up on shady characters

Malcolm Davison explains how to construct 3D cones and cylinders

Having established how to draw an ellipse (*Popular Computing Weekly* October 7) this article paves the way to constructing 3D representations of cones and cylinders and introduces the idea of 'shading' to give the illusion of solidity

To draw the cylinder I first planned the drawing on graph paper marked with the plot and print positions The lengths and positions of the major and minor axes can quickly be ascertained and the lengths of the lines between them

Coding was straightforward see cylinder Lines 60-140 and 400 510 draw the outline of the ellipse while lines 795-812 draw a series of lines of the same length from different plot positions The second half of the *Plot* statements in lines 400 410 500 and 510 are repeated for the *Draw* statements

Cylinder 2 is the same as cylinder up to line 520 but adds a shading routine and draws the right hand edge of the cylinder The shading effect is produced by plotting the circumference of an ellipse but reducing the frequency of the plotting points (lines 795 and 796) and then using these points as the starting position for a *Draw* statement Line 794 draws the top line of the cylinder

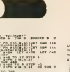
Cylinder development

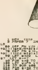
The cone is a development of the cylinder Lines 1-530 draw the ellipse and lines 620-637 draw the left hand lines to the tip of the cone Lines 650 654 draw the right hand lines and lines 685 690 draw the lines to the extremities of the ellipse

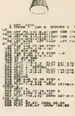
Pattern 1 starts as a straightforward plot of an ellipse The value of the major axes (*m*) is increased during each loop While the count a in line 90 is sufficient for the first full circumference of the ellipse as *m* increases it falls short for subsequent loops As a result it produces curves to the left and right of the ellipse

'Pattern 2 is the result of repeatedly plotting an ellipse further along the *x* axes The program runs for about three quarters of an hour If you want a record of it store it on tape using *Save* pattern 2 *Screen*

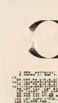
If you want an intermediate printout just press the *Shift* and *Break* keys followed by *Copy* After the printout is complete press *Continue* If at any time you want to know how far the program has got — break into the program and type *Lprint* which will print the value of the loop count (1 to 50) onto the printer and so will not affect the display Then press *Continue*



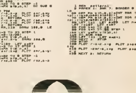




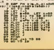












Channelling musical talents

***Peter Donn** presents a program to turn the BBC micro (A or B) into a musical synthesiser*

Who would have thought you could fit over three octaves of a musical stave onto a typewriter keyboard, including sharps and flats? Well, the following program does just that.

The first key used is 'Z' which represents the first 'C'. The second keyboard row is the 'black' notes. The scale continues on the third row with their black notes on the fourth row. The shift key has been utilised on the first row so three octaves of 'C' can be fitted onto the keyboard including D and E above the highest 'C' which are often used in musical tunes.

The program is called 'synthesiser' since you can play in any of three voices: piano, xylophone or organ. These voices can be selected by function keys 4, 5 and 6 respectively.

Several other sound effects are contained in function keys 0-3. These are:

0 High frequency cannon shot
1 Medium frequency cannon shot
2 Low frequency cannon shot
3 This is rather a special effect. It performs a 'ruler twanging' operation proportional to the frequency of sound channel 1 at that moment. Try it out and you will see what I mean.

Function keys 7, 8 and 9 contain three separate 'pages' of tunes displayed in the form of different characters. If you want to play one of the tunes, use the cursor control keys to take the editing cursor to the start of the tune. Now press the copy key and keep it held down. It may surprise you to find that this is identical to playing the whole tune on the keyboard.

The displayed characters are a very good way of helping people learn to play various tunes by heart.

The program starts and the function keys are assigned their roles in lines 30-120. Line 130 enables the user to start off in piano mode. Line 140 defines the envelope for channel 0 sound effects, giving priority to the amplitude part of the envelope. Line 170 assigns the complete keyboard to A$.

On line 210 the program starts a quick analysis to see if a key is being pressed down. Line 220 checks to see if the shift key is being held down. Lines 230 to 320 determine if you have selected one of your options.

The next command, on line 330, is very useful. It detects a string or a character within a string, and stores its value, eg if B$ had been 'Z' then *Instr(A$,B$)* would be one.

Procedure *Stop* simply empties the buffer for sound channel 1; the following three procedures perform four different channel 0 sound effects. Next, the three voices are defined using envelope once again.

Finally, the three pages of tunes are incorporated in three procedures. You can see from this how easy it is to make up your own tunes and play them using the editing keys.

```
5 REM SYNTHESISER BY PETER DONN  82
10 MODE 7
20 PRINT
30 *KEY 0 a
40 *KEY 1 b
50 *KEY 2 c
60 *KEY 3 d
70 *KEY 4 e
80 *KEY 5 f
90 *KEY 6 g
100 *KEY 7 h
110 *KEY 8 i
120 *KEY 9 j
130 PROCENV1
140 ENVELOPE5 1,2,0,0,1,1,1,0,-1,-2,-3,126,100
150 *FX 11 30
160 *FX 12 30
170 A$="[illegible]"
180 PRINT"THE THREE INSTRUMENT MODES, MUSIC PAGES AND OTHER SOUND
EFFECTS ARE CONTROLLED USING THE FUNCTION KEYS. FOR DETAILS OF
THESE SEE FOR ISSUE(Fill in necessary no..). IT IS ADVISABLE TO PUT
LABELS OVER THE FUNCTION KEYS."
190 PRINT''"  THE PRESENT MODE IS SHOWN ABOVE"
200 PRINT''"  O.K. I'M READY FOR YOU LIBERACE"
210 B$=INKEY$(0)
220 IF INKEY(-1) F=19 PROCSTOP:GOTO 330
230 IF B$="a" PROCNOISE1
240 IF B$="b" PROCNOISE2
250 IF B$="c" PROCNOISE3
260 IF B$="d" PROCNOISE4
270 IF B$="e" PROCENV1
280 IF B$="f" PROCENV2
290 IF B$="g" PROCENV3
300 IF B$="h" PROCTU1
310 IF B$="i" PROCTU2
320 IF B$="j" PROCTU3
330 F=INSTR(A$,B$)+1
340 IF B$="" OR F=1 THEN210 ELSE PROCSTOP
350 SOUND1,1,(F*4)-4,5
360 GOTO210
370 DEFPROCSTOP:*FX 15,0
380 ENDPROC
390 DEFPROCNOISE1:*FX 15,3
400 SOUND0,2,4,10:ENDPROC
410 DEFPROCNOISE2:*FX 15,3
420 SOUND0,2,5,10:ENDPROC
430 DEFPROCNOISE3:*FX 15,3
440 SOUND0,2,6,10:ENDPROC
450 DEFPROCNOISE4:*FX 15,3
460 SOUND0,2,3,10:ENDPROC
470 DEF PROCENV2:PRINTTAB(12,1);"XYLOPHONE MODE  ":ENVELOPE1,1,0,0,0
1,1,1,-4,-10,-13,20,126,100:ENDPROC
480 DEFPROCENV1:PRINTTAB(12,1);"PIANO MODE     ":ENVELOPE1,1,0,0,0
1,1,1,1,3,-1,-1,126,100:ENDPROC
490 DEFPROCENV3:PRINTTAB(12,1);"ORGAN MODE     "
500 ENVELOPE1,5,1,-1,1,1,1,1,-4,-12,-4,-4,100,100:ENDPROC
510 DEFPROCTU1
520 CLS:PRINTTAB(11,8);CHR$131;"SELECTION 1"
530 PRINTCHR$130;"[illegible]"
540 PRINTCHR$130;"MATCH OF THE DAY"'"[illegible]"
550 PRINTCHR$130;"STAR WARS"'"[illegible]"
560 PRINTCHR$130;"THE FLINTSTONES THEME"'"[illegible]"
570 PRINTCHR$130;"THE BLUE DANUBE"'"[illegible]"
580 ENDPROC
590 DEFPROCTU2
600 CLS:PRINTTAB(11,8);CHR$131;"SELECTION 2"
610 PRINTCHR$130;"[illegible]"
615 PRINTCHR$130;"ROBIN HOOD"'"[illegible]"
620 PRINTCHR$130;"WHEN THE SAINTS"'"[illegible]"
630 PRINTCHR$130;"BLACK BEAUTY"'"[illegible]"
640 PRINTCHR$130;"FOR A DAISY"'"[illegible]"
650 PRINTCHR$130;"SUPERCALIFRAGILISTICEXPIALODOCIOUS"'"[illegible]"
660 ENDPROC
670 DEFPROCTU3:CLS:PRINTTAB(11,2);CHR$131;"SELECTION 3"
680 PRINTCHR$130;"THE ENTERTAINER"'"[illegible]"
690 PRINTCHR$130;"PUFF THE MAGIC DRAGON"'"[illegible]"
700 PRINTCHR$130;"COLONEL BOGEY"'"[illegible]"
710 PRINTCHR$130;"MORNING GLORIES"'"[illegible]"
720 PRINTCHR$130;"THE WOMBLES"'"[illegible]"
730 PRINTCHR$130;"HALLELUJAH"'"[illegible]"
740 ENDPROC
```

Continued from page 13

unfair US version of Pontoon 21 or Vingt et un where you have to beat the dealer's hand not merely equal it *Craps* is the dice game so favoured in Western saloons and *Roulette* will take you and your wallet to Monte Carlo The graphics on the first two games are good although *Roulette* cheats a little by only showing the section of the wheel containing the ball

All the games are well-written and appeared close to the originals in terms of the speed at which they emptied your pockets Indeed my innocent little Spectrum was the object of much abuse, accusations of cheating etc, when this cassette was produced late one evening After one run of particularly abysmal luck, I wondered if this cassette was not in fact financed by the Salvation Army as a demonstration of the pitfalls of gambling If you are a financial masochist this is obviously the tape for you

The last section of Spectrum software comprises some of the utility programs available

Character Programmer (ZedXtra Software) allows you to define your own 8 × 8 graphic characters on a large grid on the screen It comes with clear if mis spelt documentation as well as data to define invaders tanks aircraft etc Although it does a satisfactory job in defining and storing the new characters I find it easier to scribble away on a piece of graph paper

If you have to have a character generator program then better value would be to acquire Altwasser's *Cambridge Colour Collection* which contains a similar program (plus 19 others) or Automata's *Character Generator* which also contains many different character sets ready programmed Indeed most Spectrum owners will by now be the proud possessors of Sinclair's apology cassette *Horizons* which contains an excellent character program

Rushed finish

Picture Maker (JWV Software) is, quite frankly, a muddle There is no documentation and few instructions on screen It is not mug trapped at all and frequently produces error messages even when the correct entry is made From a glance at the listing it could have had some potential but shows clear signs of a rushed finish or the ZX Microfair It is not in the same league as say, *Green Warrior*, from the same firm

The last utility program is *Superdraw* from Video Software This has to be tremendous value Five pounds will bring you an excellent high and low resolution drawing program with circle colour fill and large and small text options a screen design pad an easy-to understand instruction booklet and a spoken commentary on the reverse of the tape

To further demonstrate the potential of this program there are several stored screen displays, including a detailed map of Southern England as well as a redefinable large character set Any picture drawn with this program can be stored in your own programs — I wish all software houses offered such good value for money

Machine Code

Ian Stewart and Robin Jones present a new series for beginners

. . . the day after tomorrow

There are only two registers left to discuss and both have similar functions — they can both alter the address part of an instruction while the program is running

Indirection

Let us have a look at the I-register first We will invent a new opcode *Ldi* or "load indirect" Like *Hlt*, it doesn't have an address associated with it To the machine, it's just like an *Ld* instruction except that the high bit of the address field is set to "1" This bit is called the *indirection flag* who simply indicates to the computer that indirection is in force So the binary form of the *Ldi* instruction is

```
| 0 0 0 1 | 1 | 0 0 0 0 0 0 0 0 0 0 0 |
   opcode   |      address (not used)
            └ indirection flag
```

The hex code is 1800 When the computer encounters this instruction it uses whatever number is in the I-register as the effective address So if the I-register contains 1E4 and an *Ldi* instruction is executed, the effect is exactly the same as if the instruction had been *Ld* 1E4 In other words, the I-register acts as a memory pointer, and we can move it around to our heart's content if we can do arithmetic with it. That means moving values into the A-register because that's the only place we can do arithmetic So we'll invent an opcode *Xai* for "exchange contents of A-register with contents of I-register

The indirection flag can be set for any instruction which has an address part. So we can have *Sti*, *Jpi* *Addi* etc, and in each case, the last three digits of the hex code will be 800

An example

Let's look at an example which uses these ideas Suppose that we want to initialise a 1D array of length 20, to hold the numbers 2, 4 6, 8 ... 40 In other words we want a machine code equivalent of the Basic

```
FOR C = 1 TO 20
LET A (C) = C*2
NEXT C
```

There is a series of values which is going to have to be stored in memory somewhere to make this work They are 1 (because the loop count goes up in ones) 2 (because that's the increment for the array contents) and 20 (which is needed to test for the end of the loop)

For the moment we do not want to be bothered with exactly where these numbers should be stored so we are going to refer to these addresses temporarily by names (just like Basic names) We'll have to convert these to numbers when we finally get to machine code, of course This is an application of Jones's First Law of Computing "Never put off till tomorrow what you can put off till the day after"

So, we'll assume that the numbers we want are available in locations called N1 N2 and N20 Similarly we'll have a location called *Base* which holds the address of the first element of the array, and one called *Count* which will act as the loop counter

First, we set the I-register to point to the base of the array

```
LD      BASE
XAI
```

Then we set the *Count* to 1

```
LD      N1
ST      COUNT
```

Now we double this (by adding it back into the A-register) and store it in the location pointed at by the I-register (We talk about "storing *through* the I register" for short)

```
ADD     COUNT
STI
```

We "undouble" the value on the A-register again subtract 20 and see if the result is zero If it is we've finished

```
SUB     COUNT
SUB     N20
JPZ     OUT
```

Out is another, as yet unspecified address We don't know where it is yet because we don't know where the program ends, and so again it's useful to give it a name temporarily

If the branch doesn't occur, we add 1 to the *Count*

```
LD      COUNT
ADD     N1
ST      COUNT
```

and increment the I-register by 1

```
XAI
ADD     N1
XAI
```

The current *Count* is now back in the A-register so we can loop back to the doubling operaatin

```
JP      LOOP
```

provided we give the "*Add Count*" instruction the symbolic address "*Loop*" Let's do this by preceding the instruction by its symbolic address followed by a colon

```
LOOP  ADD COUNT
```

Reproduced from *Machine Code and better Basic* by Ian Stewart and Robin Jones (price £7 50), by kind permission of Shiva Publishing Ltd 4 Church Lane, Nantwich, Cheshire CW5 5RQ

If you have any machine code subroutines/tips/games, please send them to: Machine Code, *Popular Computing Weekly*, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF

Peek & poke

Peek your problems to our address. Ian Beardsmore will poke back an answer.

COMMAND PERFORMANCE

Howard Roberts of Stockport, Cheshire, writes

Q **We have just got one BBC model B. I would like to know if there is a way of disabling the *Break* key.**

A This is done by the command

```
*KEY 10 ___
```

where the instruction you want up on the screen when you press *Break* is between the inverted commas This is most commonly used for restoring and running the program, which would take the form

```
*KEY 10 OLD|M RUN|M
```

CALLING NAMES AT RANDOM

I McIntosh of the Cheviots Oban, Scotland, writes

Q **I have just received my 48K Spectrum, after what seems like a long wait, and I am very pleased with it I would like to use it to draw names at random I do not need a lot of names, and it does not matter if they are repeated sometimes I have tried splitting a string using *To* but that only gives me bits, not complete words. Can you help?**

A This program should do the job I have used a colon as the marker between each word, but other symbols could be used If you have a really long list of names you might find it convenient to break the A$ into several strings Remember that once you have entered the string you must use *Goto* 30, or else you will wipe it out

```
10 DIM A$ (Total length of the string
   you want)
20 INPUT A$
30 LET Z = INT (RND * Last but one
   colon) + 1
40 IF A$ (Z) =    THEN GOTO 100
50 IF NOT A$ (Z) =    THEN GOTO
   30
100 LET Z = Z + 1
110 PRINT A$ (Z)
120 IF A$ (Z) =    THEN GOTO 200
130 IF NOT A$ (Z) =    THEN GOTO
   100
200 PRINT  ANOTHER GO?
210 INPUT B$
220 IF B$ =  S  THEN STOP
220 PRINT
280 GOTO 30
```

Because I have used a *Dimension* for the string A$, it is possible to look at every member of that string Each word is seperated from the others by a colon For example, you ought start A$ off with

:DAVID:IAN:RICHARD:

Line 30 selects a random number, which is checked to see if it is a colon When a colon is found the characters between that colon and the next are printed in a line Remember when *Dimensioning* your string to allow space for the colons Your *Rnd* number should be the last colon but one, as your string should start and end with a colon

COMPUTER DECATHLON

Andrew Lennox of Tring Hertfordshire writes

Q **I have recently ordered a BBC Model B micro. Apart from hoping that I will not have to wait months and months, I would like to know if it will be possible to chain programs on it. I want to write a computer decathlon of short games where the player will have to go from game to game with no time for resting in between. The program must also *Run* as soon as it has *Loaded* How do I do this?**

A The command that you are looking for is *Chain* "filename" Another way round the problem would be to write the 10 programs as one using 10 sub-routines If the programs really are short there should be enough memory available It would also mean that you could keep a running score from routine to routine

TRIAL AND ERROR

Raymond Connell, Stenhousemuir, Stirlingshire Scotland writes

Q **Could you please tell me how I can find out which chips are, or are not, working in my Sinclair 16K Ram pack? While trying out another power supply, because the Sinclair one could not handle my ZX81, Ram pack and Maplin keyboard, smoke appeared from the back of my Ram pack Although everything works perfectly now, I found that I only have 13K of Ram left. I would like to replace the damaged ICs but do not know how to isolate the faulty chips.**

As my ZX81 was in kit form, I use my own power supply Could you recommend another one

A I do not know any way of finding out which chips are faulty other than by trial and error Replace each chip in turn until the culprit/s are found

It would seem that the problem is not with one of the 4116s but with one of the support chips Either part of the memory is not being addressed or you have a failure in the *Refresh* signal somewhere In practice, I'm afraid that it would be easier to buy a new Ram pack or make do with 13K

As for the correct power supply, the one supplied by Sinclair is the obvious choice Sinclair's earlier supplies were less than one amp, but the later ones are a little above one amp, which may be enough for your needs

The one person I know who uses a kit-built ZX81 also built his own power supply which is just over two amps I think your best option would be to ask your local electrical shop if they can recommend a supply

DECISION TIME

S Dennison of Simmonds Way Chelmsford Essex writes

Q **I have owned a ZX81 for four months I am now thinking of buying a graphics Rom expansion both for games and because lower case letters would be helpful in other programs**

The Roms that I have seen advertised are by Kayde, DK-tronics, and Quicksilva. I want to buy one that is simple, and preferably does not require any soldering

I have already spent £25 on a Ram pack I wonder if it would be better to sell my system and get a Spectrum instead

A This is a decision that only you can make But you must keep in mind the number of user defined graphics that you want The Spectrum can only use 20 at once (A to U) While this should ordinarily be more than sufficient every letter that you assign a graphics character to cannot then be used as a letter either in upper or lower case

Any of the graphic Roms that you mention will increase the potential of your character font considerably But each time you power up you will have to program the definitions of each character unless you store the definitions on tape and *Load* them as a separate program However the graphics 4K Rom from DK-tronics gives you about 450 extra ready made characters

Fitting the DK tronics chips will mean soldering, though only three connections are involved Quicksilva's User-Defined Graphics Chip can be fitted without soldering if you use the QS motherboard or the QS connector

FLIGHT PATH

Tim Deans Mallowdale, Middlesbrough Cleveland writes

Q **I have been trying to write a Basic games program on my Vic20, but I am having problems with inputs For example, a player is flying a plane on a level course If he wishes to increase his height, he presses key 1. The computer checks for this with an *Input A*, and then *If A = 1 then*.**

However, if the player does not *Input* a command the computer prints a prompt on the screen and waits for a command to be *Input* How can I make an *Input* that will work only when a key is pressed and ignore it if a key is not pressed?

A By the very nature of the command *Input* it cannot be ignored The instruction you need to look at is the *Get* command which can create a similar effect Try this short routine

```
10 GET A$
20 IF A$ < "1" OR A$ > "2" THEN
   GOTO 300
30 IF A$ = "1" THEN GOTO 100
40 IF A$ = "2" THEN GOTO 200
100 PRINT "Aeroplane goes higher"
   GOTO 10
200 PRINT "Aeroplane goes lower"
   GOTO 10
300 PRINT "No change" GOTO 10
```

I have put this into a loop but you can break out of it easily enough There could be more instructions at lines 100 and 200 as these would form the subroutines that actually move your aeroplane on the screen In this example I have used *Goto* instead of *Gosub* because a "2" *Input* would *Return* you to the start of the next subroutine (100)

Classified

BOOKS FOR DRAGON 32
AND TANDY COLOUR COMPUTER

101 Colour Computer Programming Tips and Tricks £8 95
55 Colour Computer Programmes Home School Office £8 95
55 more Programmes Home School Office £8 95
The Colour Computer Songbook 40 songs £5 95
My Buttons are Blue (Poetry Generator) £5 95
Colour Computer Graphics £7 95
Other books for PC1211 PC1500 Casio FX700 and Apple
Posts add 60p per book post and packing maximum £1.50
Sole UK agents Dealer enquiries welcome

ELKAN ELECTRONICS
Free post (No stamp required)
28 Bury New Road Prestwich
Manchester M25 8LZ
Tel. 061 798 7613 Prestel No 258 3622

New book for Spectrum

The Working Spectrum

A library of practical subroutines and programs
By David Lawrence
Only £5 95 inc p&p
This is the first book for the **Spectrum** to take you beyond the manual
David Lawrence develops a collection of sophisticated yet practical programmes and games from re-vealed subroutines
If you want to make the most of your **Spectrum** you must have this book
Published in association with *Popular Computing Weekly*
Send cheques/postal orders for £5 95 to The Working Spectrum, Sunshine Books Hobhouse Court 19 Whitcomb Street, London WC2 7HF
Please allow 28 days for delivery

SPECTRUM 16/48K software fruit machine fast spinning 9 fruits in view 40 per reel nudge up/down holds multiway jackpot gamble/collect running total superb sound and colour graphics plus Othello difficult opponent both on tape with large menu program bargain £4 50 K Sylett 116 Sorrel Bank Forestdale Croydon Surrey CR0 9LY

ZX SIMULSOLVE, efficient solution of simultaneous linear equations with many unknowns Details SAE Cassette ZX81 £4 Spectrum £4 95 Alan Turnbull 85 Vicarage Road Stockport SK3 8HL

VIC20 + cassette + 16K add on + database + Super Lander game 1 month old sold mint condition worth £360 quick sale £270 Wanted Sinclair printer will pay reasonable price Tel 0274 590358

ZX81 16K Adventure game Treasure Cove truly 16K game for the thinking computer addict bargain at £4 inc P&P Cheque/PO to Mr J Welles, 25 Coxheath Road Church Crookham, Aldershot, Hants

ZX80 16K RAM Space invaders Breakout three books to go to highest bidder Simon Grove 01-878 4187 (evenings only)

VIC20 Datasette 3K RAM 8K RAM hi-res lightpen joystick books £360 Consider part exchange with synth (0248) 870244

BBC SOFTWARE
Educational and Leisure programs
Space Academy 32K Driving Test 32K Guinness 32K England 32K Battle Ships 32K Film Buffs 32K welcome Programs £4 inc. 2 for £8 inc S.A.E. for details
Sent by return of post after cheque/POs cleared Mail order only
SWIFT LINK SOFTWARE
118-120 WARDOUR STREET W1V 4BT

LOVE — a 16K women's adventure game

still in the notoriously funny Pete Hall Meet the xylophonist Brunhilde the rude Sinclair Indian mystic Mr Ram Pac and more interactive machine coded and fast. **Cassette £5 95** inc instructions **RAMSOFT 16 George Street Brighton BN2 1RH (tel 0273 683354)**

SPECTRUM & SHARP MZ-80K

SOFTWARE LIBRARY

Low cost weekly hire from only **80p.** Comprehensive catalogue available **FREE,** covering games languages and utilities. New Real are constantly being added Send stamp for your catalogue now (please state model)

To. KERNOW SOFTWARE LIBRARY
58 Elliot Drive, St Germans
Saltash, Cornwall PL12 5NL

SILICON SOFTWARE
ZX SPECTRUM/MZ 80K

Cassette I. for Spectrum Elephants Graveyard/sales, etc compulsive games of skill for only £2 95
Cassette II for MZ 80K Word Search create your own puzzles with ease only £4 95
Cheques/POs payable to Paula Shore **Silicon Software 34 Short Lane, Stanwell Middx TW19 7BQ.**

ASR 33 TELETYPE with tapepunch, tapereader and pedestal Working well surplus to own requirements £175 Tel 041 332 0682

ZX81 16K plus software £60 Tel 0704 893793 after 5 pm

MZ80K 48K MACHINE. One model cell has £50 of software Very good condition Selling for £375 Tel (08278) 4426

BBC MICRO SOFTWARE for model A — Bomber Depthcharge Haunted Hangman — included full instructions all for just £4 95 (including P&P) cheques/postal orders to M A Jennings, 5 Mornington Avenue Wokingham Berks RH11 4UE

VIC20 SOFTWARE. City Bomber 3-D Maze Lunar Rescue Horse Race and Super Trap using excellent colour sound and defined characters All for only £4 95 Phone evenings 0460 40744 for details

16K SUPER BRO 2, cased, modified Segmon Basic 1 3 and 4 £200 with extras £150 Tel Mr Goodwin (0202) 889352

SHARP MZ80K wanted must be reasonably priced Lowsider peripheral Tel Gerrards Cross 83031

ACORN ATOM DISC DRIVE 5¼in unused cost £350 sell £230 Tel (0436) 65365

ZX81 16K programs. Dot Muncher and Earth Lander very addictive £4.50 Tel 0805 53521

BBC COMPUTER GAMES which make imaginative use of the versatile sound colour and graphic facilities. These competitive games are for the whole family and can be played at different levels SHAPE and RACE are on one cassette at £5 50 SIGNALS and MAGIC are on one cassette at £5 50 Model A or B Cheque/PO/Transcash No 61 413 1707 H & H Software Dept W, 53 Holloway Runcorn Cheshire

BLANK CASSETTES
C12s and C15s Best Quality Leader Computer Cassettes live situated ONLY £5.20 inclusive of VAT & P&P
LEADERLESS CASSETTES
10 C15s with no leader ONLY £7.00 inclusive
Send cheque/PO to:
SONSUP LTD 62 TRITTON ROAD
LONDON SE21 8DD
Tel: 01-670 8096

BBC USERS
Fantastic wire game for model B superb and coded sealed and caged Several phases of play getting more difficult as score increases You'll find wire game is totally absorbed so be **added** and is one game you **won't** regret buying and that's a direct promise Cheques or POs to £4 95 to
SPELLBOUND
176 Red Bawtry Road Rotherham South Yorkshire S60 3LR

DRAGON 32 SOFTWARE
Cassette of programs including Sword Defend Bars Cross Match Tit tac, Sepahp Mass, Valhubnie Circles Circal Spiral Musical Keyboard, Photographic, Motoring Costs Tacograph Resistance Pools Video and Index.
£4.95 inc P & P
Video Productions, Dept POC
11 Flordon Road, Newton Flotman,
Norwich NR15 1QX

SPECTRUM 16K CASSETTE ONE Fast moving and very addictive with colour graphics and sound Defender Asteroids Missile Bainum Bombrun all for £5 50 R Bhattacharya 3 Wensley Close Harpenden Herts.

PACMAN-81 Superb fats moving 6K, machine code game for ZX81 featuring 1 to 4 ghosts powerpills, sideshow fruit, bonus man increasing speed Cassette £3 95 A. Laird 9 Franklin Road Saltcoats Ayrshire KA21 5NT

VIC20 cassette 16K expansion super expander forces software plus dust covers perfect condition, still boxed £240 Tel Basingstoke 84889

ZX81 M/C 10 1K GAMES Cassette £3 50 Defender Landers Muncher Thrust Hi-Score Scramble Blaster Galaxians (Free catalogue) I Morrison, 17 Winton Circus Saltcoats Ayrshire

BBC SOFTWARE MODEL B or 32K Model A Mutant Invaders Wild West, Earth Defende Auto Dodge Breakout, all five £4 50 from A. Holmes Fairway House Ghyll Road Crowborough Sussex

ZX81, New Rom £8 00 Thurnall I-O Board £9 00 Various cassette programs and books on Basic Details Pyatt 23 Arundel Drive Orpington, Kent

GOOD 6502 GAME PROGRAMMERS REQUIRED

High royalty payments with guaranteed national distribution — we only want the best because we only provide the best software

If you are willing to work hard and feel you could earn a tremendous amount of money very quickly

To find out more telephone Norman Rabin on 01-203 5161 — right away

A NEW RETAILER for *Sinclair accessories in the North of England!* We are situated near the **M1** and **M62** motorways. As well as a complete range of hard and software our service department can repair modify or fit a wide range of accessories Hours of business 10 am — 8 pm Monday to Saturday inclusive
TELEPHONE PHILIP COPLEY ON 0924 272545
FOR FURTHER DETAILS.

ZX81 VIDEO INVERTER Saves your eyes Increases safe level displays sharp white characters on solid black background screen Kit £4 built £5 (includes VAT and P&P Instructions) Reviewed in *Popular Computing Weekly* August 26 Send cheque/postal order to D Fritsch 6 Station Road Thelwall Warrington Cheshire WA4 2HS

DE TRONICS 32K PLUG-IN RAM for the original version of 16K Spectrum (No good for latest c/board design) £27 50 Tel Mr Wilson 01-863 4305 evenings only

BLANK CASSETTES C15 with case 40p back Cassette labels in blue white or yellow 20 for 36p Inlay cards in red blue or yellow 20 for 60p Library cases 9p each Postage on each complete order 25p Stonehorn Ltd 59 Mayfield Way Barwell Leicester LE9 8BL

ZX81 16K with cassette recorder and TV plus rest of software, £75 Tel Medway 721082 (evenings only)

SPECTRUM RENUMBER instantly renumbers all or parts of program All Goto's Gosubs etc included The first and probably the best in M/C for only £3 95 David Webb Southolme 9 Park Road Woking Surrey

TANGERINE with lots of software manuals magazines plus tape deck £230 ono Write Paul Duckett, 85 Brennan Road Tilbury Essex

ZX81 16K with video inverter uncased keyboard technomatic user port plus 9 games cassettes including defender 3D defender asteroids and 7 books All in good condition worth over £300 will accept £110 Phone 01 373 6514 after 4 pm

DRAGON 32 SOFTWARE on tape from £1 65 Send sae for list ATL(D) 115 Crescent Drive South Brighton BN2 6SB

PRINTER wanted OP100A or GP80A as new Mitchell Leicester 700546

VIC20 with cassette, programmers aid cartridge books magazines and software Seldom used, still boxed £150 ono also colour TV (defective sound for all channels) £25 Tel East Kilbride 26003

FROG. An Arcade game for the 32K BBC Manoeuvre your frog across a motorway and a river Features include animated snakes beavers crocodiles and diving turtles Available from James Hager 7 Boxsel Street Camborne Cornwall Price £6 50

TRS-80, model 1 level 2, VDU plus dust covers £100 software + books £350 ono Sittesham 394 after 6 pm.

VIC20 and cassette tons of software joysticks books mags only £200 ono Tel 0244 300437

VIC20 CHEESE CHASER! A totally new and addictive game for 8K expansion Can you capture the mouse in the van before rat eats all your cheese? Full colour and sound only £4 also games pack-1 5 games on one cassette for the unexpanded Vic £4 Michael Marks 45 Talbot Crescent Leeds LS8 1AL.

Computer Swap

PET 4016, small screen 16K, toolkit Rom, one year old £400 ono David Ram 01 367 5036 (evenings)

SUPER BOARD THREE 8K Ram PSU cased with manuals and games tapes £65 for quick sale Tel Andrew on 0827 289484

VIDEO GENIE. Joystick, lower case sound, £200 of additional software Adventures and scripts books and manuals £280 ono Tel Bedford 53322.

ZX81 16K Ram pack and software tape with 20 games Six commercial cassettes £75 ono Tel Ruislip (08956) 78728 Peter May after 5 pm evenings

VIC20 CASSETTE DECK. Programs and literature also with user-definable graphics capability £180 ono Tel Chris at Swindon (0793) 770925 evenings

ATARI VIDEO GAME SYSTEM, plus Combat, Asteroids and Pacman excellent condition £110 ono Tel Letchworth (04626) 72550 after 4 pm.

ZX81 1K with software £40 Tel Flint (03526) 61967 after 6 pm

MATTELL INTELIVISION plus 8 cartridges, perfect condition still boxed 9 months old £200 ono Tel Matlock (0629) 2990 after 4 pm

EXPANDED ZX81 with keyboard 32K Ram graphics Rom all manuals, leads PSU £25 worth of software £12 worth magazines Price £90 Tel Southport (0704) 27941 after 3 pm

8K UK 101 Cased 6502 machine code plus Basic. Daine Feldman Tel (0279) 37929

ZX81 plus 16K plus I/O port and information and software £75 Tel Hornchurch 51967

NASCOM 1 32K RAM basic graphics various modifications cased complete and working unwanted system £100 ono Tel (07782) 5525 any time

ATARI video computer game complete with COMBAT cartridge used once and still under guarantee £70 Tel (0322) 862843

VIC20 COLOUR COMPUTER plus cassette deck and *Vic Revealed* by Nick Hampshire good condition £170 ono C Guy Luton 391725

VIC20 with cassette unit plus *Vic Revealed* hardly used £180 ono or swap for BBC printer or disc drive Telephone 090-567 444084

ZX81 16K with video inverter over 80 programmes and games for professional only £70 Phone 021-554 4383

16K ZX81 with graphics toolkit and machine code games tape Professional programmer able to give training to novice buyer £65 ono 01 205 7530

SUPERBOARD 3 8K RAM 5 volt 5 amp PSU modulator case segment plus new basic 1 3 4 5 Manual plus games, £170 ono Tel 01 204 4368

UK101 — 8K RAM, Mono 2 PSU toolkit joysticks, mini EProm board lots of software £280 Tel Bradford 0274 727 635

SPECTRUM 48/K, brand new box unopened why wait Beat offer gets immediate delivery 01 367 2823 (eves or w ends)

VIC20 under guarantee cassette joystick, programmers ref guide intro to basic software mags worth £450 £350 ono Tel 0253 882521 — after 5 pm (will sell separately if required)

16K ZX81 KEMPSTON KEYBOARD magazines, £30 software inc 3D Defender Group Galaxians Scramble excellent condition £85 ono Tel 094/6 810972 (eves)

ZX81 16K RAM PAC (Tel 368-0180 between 4 pm 5 15 pm only)

ZX81 with 16K RAM PAC plus software £75 Mr A Butt Tel 01 461 8627 (days) 01 743 5198 (evenings)

TRS80 model 1 level 11 16K VDU cassette manuals £220 ono Telephone 0825 43613 (evenings)

VIDEO GENIE 16K with extra keys VV meter and sound Including software (assembler disassembler games etc) and some mags current price new £400 sell for £250 ono 01-861 1438

ZX81, 1K, Sinclair built very good condition plus books and magazines worth £70 Yours for £40 Contact Peter Galvin 0582 30170 after 4 30 pm 201 Hitchin Road Luton

ATARI 400 AT 48K single disc drive tape drive £300 of software including micro soft Basic £800 ono 10 months old Tel 572 2917

SPECTRUM 16K, £110 ZX printer with 5 rolls of paper £50 Atari games computer with 7 cartridges including Pacman £200 Wellington Somerset Tel 0823 47 2280

VIC20, cassette deck Avengers cartridge + cassettes games 10 months, £180 ono C W Brett Lichfield 06432 28137

VIC20, cassette deck, Blitz cassette four cartridges, Superlander, Ratrace Pacman Alien complete with joystick £200 ono Tel 01 346 0243 anytime (Mark)

VIC20 CASSETTE DECK 3K RAM, 3 games cartridges (Alien Super Lander Avenger) power supply and leads for £220 Ring Mike Tayler 01 242 4433 ext 4001 days or Gravesend 873875 eves

VIDEO GENIE EG 3003 16K + extra keys + sound box built in cassette deck, £300 ono Dave Milburn Bristol (0272) 689685 (messages)

RADIO CONTROL playing and car + gear will swap for Vic or £180 Tel Bradford 573038

ACORN ATOM with 12K RAM + 12K ROM (inc floating point ROM) manuals cables + £80 software £110 Tel 01-858 5408

TRS-80 POCKET COMPUTER, *Printer Software* cost £180 excellent condition with original packing Offers please Murray Shelley Newtown Llantwit (0443) 202827

VIC20 with 3K High Res Cartridge + cassette deck Vic Revealed book, programme reference guide + games £230 Tel 0703 775880

SUPERBOARD II, 8K RAM power supply PSU and modulator Wemon chip documentation games software £80 ono Tel Penrith (0768) 66712 after 6 pm

16K ZX81 SINCLAIR, various software £65 Tel Bognor 823361

SUPERBOARD 24K RAM 14K Basic, £70 of software cased power supply screen enhancement kit £275 ono Telephone St Albans 34560 after 6 pm

ATARI TV GAMES SYSTEM with Combat cartridge £50 ono Tel Southampton (0703) 551046

SINCLAIR ZX81 16K for sale £60 Steven Calder 22 Woodland Park Road Leeds LS8 2AZ Tel 0534 756254

MATTEL INTELIVISION GAME SYSTEM perfect condition Soccer Basketball Skiing Tennis + Star Battle cartridges £180 Tel 0780 337623 Mr Worthy

ZX80 added an 8K ROM + 16K RAM slow modulator is a full ZX81 specification also software + books all for £80 (buyer collects) Tel David (0438) 53757 after 5 30 pm

COLOUR COMPUTER VIC20 still under guarantee with Data Set + 8K high res super expander software includes Pac Ram Invaders Astroids +Myriad £250 ono Tel Medway 380847

VIC20 cassette joystick super expander games tapes less than 9 months old excellent condition bargain at £230 Tel Southend-on-Sea 235 636 evenings only Mr Green

VIC20 £145 new boxed with guarantee card Tel 01 387 0738

SINCLAIR BUILT ZX81, Kempston keyboard and video inverter with PSU leads + manual £69 Tel 0203 348848 after 4 pm

VIC20 COMPUTER with Arfon expansion offered 8K Ram machine code monitor programers aid hi-res cartridge plus tapes and books £250 Tel 01 656 4173 evenings.

ZX81 + RAMPAC + printer + £50-worth of software £90 wanted Tel 01 759 0198

LOTS OF SOFTWARE including Monster Maze Adventure Tape 1 and Gulp games complete with manual + sell £80 Tel 0268 21465

ACORN ATOM 12K plus floating point power supply and screen, £180 ono Alan Harding Orpington 31744 (evenings)

VIDEO GENIE EG3003 COMPUTER 16K Ram built in cassette sound modification fitted Worth £170 ono Tel (0952) 596959

ZX81 16K RAM with good software £50 Tel Watford 37812 after 4 pm.

ZX81 16K with over £100 of software worth £200 But will accept £120 Tel 01-892 5615 5 pm to 7 pm

TRS-80, MODEL 2, Level II 16K selection of games tapes, 16 months £175 ono must sell Nick, anytime 01 316 5009

VIDEO-GENIE EG 3003, as new with manuals and over £40 books and tapes £180 Tel Bedworth (0703) 314079 Mr Harcourt 59 Longstreet, Bulkington Nuneaton

ATARI VCS with 8 cartridges (Combat Space Invaders Dodgem Superman Circus Atari Asteroids Basketball and Pacman) £170 ono Phone after 6 pm. 01-892 7048

VIC20 plus CNL cassette machine plus super expander with 3K and Vic revealed £195 ono Tel 08554 43651

SPECTRUM my new 48K computer is advised delivery 1 week November now too late Avoid 12 weeks queue Tel Smith (0628) 56771

16K ZX SPECTRUM 1 month use with many arcades and other games Including all manuals leads power supply and free sound amp only £140 Tel 01 272 3319 evenings

ZX81 with 16K Rampac and cassette 9 months old excellent condition £80 Tel 872 5756

ACORN ATOM, 7K Ram 8K Rom, few games, worth £185 yours for £175 ono Richard Wild, Crayford (2) 526739 evenings

TRS-80 Model I Level II 16K Ram numeric keypad 9 months old some games software £100 only J Falcler Southampton (0703) 464196 after 6 pm

16K ZX81 with magazine £60 Leek (0538) 385367

ZX81 1K with software and joystick £35 Tel Preston (0772) 717607

16K SPECTRUM plus ZX Printer 2 months old as new also a few programs on tape £129 ono Tel Bristol 876322

VIC20 plus 16K plus £300 of software (including top games), value £530 want only £300 Tel 01 894 0610 after 6 pm.

ATARI VCS plus £300 of software for sale £140 ono Tel Norwich 712320 after 6 pm

ATOM 12K via PSU leads manuals books magazines and quality software £120 ono Tel Garland Plymouth 265276

ZX81 16K plus software only £55 Tel 021 705 6944 after 5 30 pm

SHARP PC1211 with printer interface and software cassettes, ribbon paper etc boxed £80 ono Tel Smallfield (034 384) 2919 after 6 pm

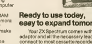
ZX81 WITH 16K RAM still under guarantee with Dictator and Star Trek cassettes dozen different mags and green glass screen £60 Imran Haq 01-902 6168

WANTED, VIC20 with cassette deck and memory expansion if possible Offers to Mr M Peacock 9 Claremont Avenue Hersham Walton-on Thames, Surrey

Sinclair ZX Spectr

16K or 48K RAM... full-size moving-key keyboard... colour and sound... high-resolution graphics...

From only £125!



First, there was the world-beating Sinclair ZX80. The first personal computer for under £100.

Then, the ZX81. With up to 16K RAM available, and the ZX Printer. Giving more power and more flexibility. Together they've sold over 500 000 so far, to make Sinclair world leaders in personal computing. And the ZX81 remains the ideal low-cost introduction to computing.

Now there's the ZX Spectrum! With up to 48K of RAM. A full-size moving-key keyboard. Vivid colour and sound. High-resolution graphics. And a low price that's unrivalled.

Professional power–personal computer price!

The ZX Spectrum incorporates all the proven features of the ZX81. But its new 16K BASIC ROM dramatically increases your computing power.

You have access to a range of 8 colours for foreground, background and border, together with a sound generator and high-resolution graphics.

You have the facility to support separate data files.

You have a choice of storage capacities (governed by the amount of RAM). 16K of RAM (which you can uprate later to 48K of RAM) or a massive 48K of RAM.

Yet the price of the Spectrum 16K is an amazing £125! Even the popular 48K version costs only £175!

You may decide to begin with the 16K version. If so, you can still return it later for an upgrade. The cost? Around £60.

Ready to use today, easy to expand tomorrow

Your ZX Spectrum comes with a mains adaptor and all the necessary leads to connect to most cassette recorders and TVs (colour or black and white).

Employing Sinclair BASIC (now used in over 500 000 computers worldwide) the ZX Spectrum comes complete with two manuals which together represent a detailed course in BASIC programming. Whether you're a beginner or a competent programmer, you'll find them both of immense help. Depending on your computer experience, you'll quickly be moving into the colourful world of ZX Spectrum professional-level computing.

There's no need to stop there. The ZX Printer – available now – is fully compatible with the ZX Spectrum. And later this year there will be Microdrives for massive amounts of extra on-line storage, plus an RS232 / network interface board.



Key features of the Sinclair ZX Spectrum

- Full colour – 8 colours each for foreground, background and border, plus flashing and brightness-intensity control.
- Sound – BEEP command with variable pitch and duration.
- Massive RAM – 16K or 48K.
- Full-size moving-key keyboard – all keys at normal typewriter pitch, with repeat facility on each key.
- High-resolution – 256 dots horizontally x 192 vertically, each individually addressable for true high-resolution graphics.
- ASCII character set – with upper- and lower-case characters.
- Teletext-compatible – user software can generate 40 characters per line or other settings.
- High speed LOAD & SAVE – 16K in 100 seconds via cassette, with VERIFY & MERGE for programs and separate data files.
- Sinclair 16K extended BASIC – incorporating unique 'one-touch' keyword entry, syntax check, and report codes.

rum

The ZX Printer – available now

Designed exclusively for use with the Sinclair ZX range of computers, the printer offers ZX Spectrum owners the full ASCII character set – including lower-case characters and high resolution graphics

A special feature is COPY which prints out exactly what is on the whole TV screen without the need for further instructions Printing speed is 50 characters per second with 32 characters per line and 9 lines per vertical inch

The ZX Printer connects to the rear of your ZX Spectrum A roll of paper (65ft long and 4in wide) is supplied along with full instructions Further supplies of paper are available in packs of five rolls

The ZX Microdrive – coming soon

The new Microdrives designed especially for the ZX Spectrum are set to change the face of personal computing

Each Microdrive is capable of holding up to 100K bytes using a single interchangeable microfloppy

The transfer rate is 16K bytes per second, with average access time of 3 5 seconds And you'll be able to connect up to 8 ZX Microdrives to your ZX Spectrum

All the BASIC commands required for the Microdrives are included on the Spectrum

A remarkable breakthrough at a remarkable price The Microdrives are available later this year, for around £50



How to order your ZX Spectrum

BY PHONE – Access, Barclaycard or Trustcard holders can call 01-200 0200 for personal attention 24 hours a day, every day BY FREEPOST – use the no-stamp needed coupon below You can pay by cheque, postal order, Access Barclaycard or Trustcard

EITHER WAY – please allow up to 28 days for delivery And there's a 14 day money-back option of course We want you to be satisfied beyond doubt – and we have no doubt that you will be

To Sinclair Research, FREEPOST, Camberley, Surrey, GU15 3BR — Order

Qty	Item	Code	Item Price £	Total £
	Sinclair ZX Spectrum – 16K RAM version	100	125 00	
	Sinclair ZX Spectrum – 48K RAM version	101	175 00	
	Sinclair ZX Printer	27	59 95	
	Printer paper (pack of 5 rolls)	16	11 95	
	Postage and packing orders under £100	28	2.95	
	orders over £100	29	4 95	
			Total £	

Please tick if you require a VAT receipt ☐

*I enclose a cheque/postal order payable to Sinclair Research Ltd for £ ______

*Please charge to my Access/Barclaycard/Trustcard account no

*Please delete/complete as applicable

Signature

PLEASE PRINT

Name Mr/Mrs/Miss

Address

POC 819

FREEPOST – no stamp needed   Prices apply to UK only   Export prices on application

RS232/network interface board

This interface, available later this year will enable you to connect your ZX Spectrum to a whole host of printers terminals and other computers

The potential is enormous And the astonishingly low price of only £20 is possible only because the operating systems are already designed into the ROM

ZX Spectrum

Available *only* by mail order and *only* from

sinclair

Sinclair Research Ltd,
Stanhope Road Camberley
Surrey GU15 3PS
Tel Camberley (0276) 685311